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An Old Bugaboo Gone to Blighty

Burden of High Ship Construction Costs is Leaving This Country—Operating Problem Alone Demands Solution

AS the date of signing the armistice draws back further into the past, a clearer vision is permitting the recognition of certain changes in the world's industrial life. The past few weeks in particular have revealed more clearly a fact which has been under suspicion for some months. This is the colossal growth of the American shipbuilding industry to a point where it not only surpasses in capacity the rest of the world combined but where it is revealing more clearly an ability to retain this position. Higher construction costs are becoming the problem of the foreigner, instead of the American.

Foreign inquiries are reaching yards in the United States. The price which American shipbuilders can offer is at least as good as any available abroad. The workmanship is clearly acceptable. More experience obviously is needed by American builders of ships and manufacturers of marine auxiliaries, and the orders now available and in prospect assure the acquisition of this experience. Holden A. Evans, head of one of the large yards in this country, a few months ago held up the importance of this problem of experience and of time for training thoroughly the hurriedly collected war organizations. With this experience, he guaranteed the power of American yards to hold their own permanently. On deliveries, advantage is altogether with builders in the United States. Contracts are placeable for delivery this year against indeterminate dates abroad, generally fixed as at least 19 to 24 months in the future.

A Big Problem Half Solved

One element of the two sided marine problem which the United States attacked unsuccessfully for so many years, that is, shipbuilding and ship operating, can be considered as settled. As a shipbuilding nation, the United States seems now to be assured of a powerful position for years to come.

On one side of ship operation, optimistic as well as pessimistic views are held but the degree of confidence in American ability to master this problem is constantly on the increase. The barrier of high costs which held back American operators for so many years, is today relatively of less importance. Congress and the shipping board are revealing a greater appreciation of the need for correcting the several artificial restrictions, such as methods of interpreting the measurement regulations.

Attendance at the conference held at the shipping board offices in Washington in May, revealed the powerful interest now held throughout the country in this question of operating the new fleet successfully. Representatives of farmers, for instance, were there in large numbers and their remarks indicated a clear appreciation of the importance to the country of a large and successful merchant marine. They unanimously favored private ownership. A special committee representing the American Bankers' association, was in attendance and presented resolutions from the bankers calling for the development, through American companies of American shipping.

Congress Must Find the Answer

The decision as to the best plan for handling the rapidly growing American fleet rests with congress. Many leading shippers, while favoring private ownership, urge the gradual disposal of the government-owned vessels and the charter of the remaining ships for a few years, the argument resting on the need for developing an experienced and numerous group of ship operators. The house committee takes merchant marine legislation so seriously that it has secured the passage of a special resolution empowering the committee to hold sessions during a congressional recess and compel the attendance of anyone whose advice is needed. Several ship operators and bankers urge the development of shipping operators by geographical groups in order more widely to enlist the support of investors all over the country.

With half of the problem solved, the United States can buckle down to the job of finding the answer for the other half, with a greater degree of confidence than ever before. The measure of success attained in this work depends on the united study and effort of every loyal American.

World Charter Market Reviewed b

RETAINS SHIPS

United States to Retain 700,000 Deadweight Tons of Enemy Passenger and Cargo Boats

WHILE the country is still discussing the proposal of the shipping board to sell the government's merchant ships to private operators, the past month has marked some radical changes in maritime conditions. The prospective dissolution of the International Mercantile Marine Co. signalizes the dissociation of the British interests in an important American shipping venture. The organization of this company will remain and P. A. S. Franklin, its president, will have the opportunity to take advantage of that organization and float an American fleet that will be a monument to the United States. The second development which is destined to have an important influence upon the American marine was the decision of the peace conferees to permit the United States to retain the German and Austrian ships seized in our ports. Had the German merchantmen been divided upon the basis of losses, many of these vessels would have been turned over to Great Britain. By the agreement reached, the United States will retain practically 700,000 deadweight tons of enemy passenger and cargo boats. These include 289,245 tons of the Hamburg-American line, 233,758 tons of the North German Lloyd, 29,120 tons of the German-Australian line, 22,636 tons of the Hansa line, 9486 tons of the Kosmos line, and 27,984 tons of other lines.

The acquisition of the former enemy tonnage, however, concentrates a still greater maritime power in the hands of the government. Supplementing this acquisition, the United States government has purchased three of the piers of the Hamburg-American line at Hoboken, N. J. The purchase was made of the alien property custodian.

Checkmate Private Owners

Private operators are naturally restive not only over the extension of government ownership in shipping matters, but also over the continuation of such ownership as was acquired during the period of belligerency. It has been announced from official sources that the inhibition against granting passports to wives and mothers of men of the American forces abroad will be removed this month. Generally, it is proposed to make it easier for foreign traveling. On the other hand, the Interallied Maritime council will continue its control over passenger vessels even after the peace treaty is signed. This control will exist probably for several months to come. The end of government control is not yet in sight and shipping men are settling themselves down to the fate of managing and operating such vessels as the government selects to allocate to them. During the past month only 11 vessels were released and returned to their owners. These were the CARIB to the Carib Steamship Co., Inc.; the SAGUA to the Atlantic Fruit Co.; the ATENAS to the United Fruit Co.; the CROFTON HALL to the United States Steel Products Co.; the MAUMEE to the Maumee Steamship Corp.; the MAUBAU to the Compania Tobacos Filipinos; the CHINCO to the Nafra line; the MUNIDIES to the Munson Steamship Co.; the KERESAN to the Kerr Navigation Corp.; the WILLIAM M. PAGE to Castner, Curren & Bullitt; and the TRANSPORTATION to the Coastwise Transportation Co.

It is impossible for private operators to compete with the government vessels. It would probably be impossible were all of their ships returned. On the other hand, the shipping board is making an aggressive movement in the carrying trade by planning a number of definite lines to be established with allocated ships. The department of commerce is advising with the board in selecting the lines upon which to run such vessels. According to the plans already announced, three former German liners, the AGAMEMNON, the VON STEUBEN and the MOUNT VERNON, will be placed in a run between the United States and South American ports. Five vessels will be operated between New Orleans and Brazil, the first to be allocated in July. Three others will run out of New York to South America. The South Atlantic Maritime association has been formed and to it will be allocated 14 merchant craft to serve the South American trade.

Demand More Ships

The fruit trade has petitioned the shipping board to allocate 100 ships to the carriage of fruit. These are needed to serve the growers in Florida, California, Porto Rico and Cuba. It is expected that there will be a big movement of apples out for England, France and South Africa during August and September. To move the fruit crop it is estimated that 100 ships will be required with insulation space of 100,000 to 200,000 cubic feet in each. The coal exporters declare they will require tonnage sufficient to export approximately 100,000,000 tons of coal between now and the end of the current year.

In contrast with the announced plans for the government vessels is the limited activity of private American lines. A new company, at the head of which is A. Franfel, president of the French-American Steamship Co., has been formed to operate a steamboat service between Boston, South Norwalk, Conn., and New York. The Pacat Steamship Corp.

Bureau Makes Money

ON June 9, the government received over $67,000,000 when the marine and seamen's division, bureau of war risk insurance, closed business. Of this $50,000,000 was the untouched reserve and $17,000,000 profits. The division was organized as a war emergency to provide insurance on American hulls, freights, cargoes, masters, officers and crews. During its life, the division wrote insurance on hulls, cargoes and freights to the value of $2,167,367,884, its premiums totaled $46,758,995, while the losses and operating expenses were $30,181,567. On seamen, policies aggregated $321,857,430, premiums $842,148 and loss and expenses $370,596.

has consolidated with F. D. Dimmick & Co., Inc. The Brooks Steamship Co., which is to run the wooden and steel boats purchased from the government by the Nacirema Steamship Co., has started operations. This line has secured a pier at Philadelphia and a pier at Port Richmond, N. Y., and appointed Megee, Steer & Co. its Philadelphia agents. The Mallory line has determined to re-establish its full service between Mobile, Ala., and New York.

The past month has, nevertheless, been productive of a rumor that a sale of the big coasting fleet of the Atlantic, Gulf and West Indies steamship lines is pending. The report has associated this deal with the International Mercantile Marine, tant development in the American merchant marine. Its consummation is not entirely unlooked for and by many shipping men such a move would be considered an important step toward placing the American flag upon the high seas.

Frank Waterhouse & Co. is reported to be planning to follow the lead of Robert Dollar and invade the Atlantic field. Waterhouse expects to operate a line from Seattle and San Francisco to English and European ports. As agents for Suzuki & Co., Waterhouse promises to be a factor in the Atlantic trade. The Suzuki company has been loading ships at New York for Europe.

Rates Are Declining

Shippers have experienced some difficulty in getting European shipments through. But little commercial space to Liverpool has been available and the decline in the exchange value of the franc has made it difficult to ship to Havre and Bordeaux. Private operators have been considerably disturbed over the slashing of rates by the shipping board. As a consequence, the rate to Antwerp has been reduced to $28 per long ton on steel cargoes. Ships loading for Swedish and North sea ports found it impossible to continue their rate of $60 and were compelled to drop to $30. The Caravel lines loaded grain for Genoa at $30 and another ship accepted cargo for Helsingfors, Finland, on the basis of $50. Requests for bottoms with which to carry cotton to Spanish and certain other foreign ports have been persistent, with little available tonnage to offer. On the other hand, concerns exporting American commodities to Poland, via Danzig, have been in the market for cargoes. Both steamers and sailers have been in demand by the shipping agents, for which the highest market price has been offered. On the net form, the rates offering were $30 for prompt loading from New York to French Atlantic ports, with $27.50 for May and $25 for June. From the gulf there were orders in circulation for July loading at $40 to Marseilles and West Italy, and $46 to Naples.

Trade With Siberia

ABOUT 1,000,000 tons of goods are between Vladivostok and Irkutsk waiting for the reopening of the Transsiberian railway for commercial purposes, according to C. F. Just, a member of the Canadian trade commission to Siberia. "As soon as this freight can be moved to a shipping point," he said recently, "goods will begin to move into Siberia. At the present time the situation looks hopeful. There are three major factors holding up the organization and development of Siberia and holding back the immense trade that is to come. They are the unsettled political situation, the general financial situation and the railroad situation; the latter being perhaps the most important."

TRADE BETTER

With the Gradual Increase of Ocean Tonnage Offshore Shipments in all Directions Speed Up

Chartering has been done on a limited scale, a good demand prevailing for both steam and sail tonnage at unchanged rates. South American shipments have been going forward with a trifle more speed, owing to the better conditions of the labor market. To South America shipping board rates in general have prevailed, and vessels have been securing return cargoes in practically every instance. European exports have been keeping up, shippers finding the required cargo space after diligent search. A number of vessels have been constantly on berth for Scandinavian ports.

With the gradual increase in ocean tonnage there has been naturally a better movement in the offshore shipments in all directions. As a rule, exporters are not disposed to complain with the way conditions are shaping, and by July it is anticipated that there will be sufficient ships for all purposes.

There have been a large number of steamers, ranging from 6500 to 9500 tons, mostly of the war class, fixed homeward from Australia to England and Italy at 105 and 125 shillings per ton respectively for May, June and July loading. Several vessels were taken for sugar from Mauritius to London at 120 shillings for May and June loading. From the Mediterranean ports there has been a better supply of tonnage, and the tendency was fairly easy, although owners were still inclined to ask higher rates.

War Charge Removed

The leading British lines have discontinued the practice of assessing a 5 per cent premium on freight charges collected at destination. The shipping lines, however, are not disposed to encourage the collection of the charges at destination, whereas the shippers prefer this. The exchange and other difficulties encountered during the war made it necessary for the steamship lines to discountenance the preference of the shippers. That is a situation no longer existing and the action of the British companies is another indication of the restoration of normality.

Jonas Lied, organizer of the Kara sea route, upon his arrival in New York announced that 15 steamships of 3500 tons each may leave New York in mid-July to attempt for the first time in the his-

tory of American navigation the direct sea route to Siberia. The dispatch of these boats by way of the Kara sea, an arm of the Arctic ocean, which lies to the north of Siberia, has been authorized by the Kolchak government. If the attempt is successful it will establish a steamship terminal which has ready and quick access to the interior of Siberia.

A joint service of the Ellerman, Bucknell and the Ellerman-Wilson lines from New York to the Levant will be inaugurated this month with the steamship ALEPPO. Piraeus and other Near Eastern ports will be used. Norton, Lilly & Co. and Sanderson & Son will act as joint agents for the line, which will be called the American-Mediterranean-Levant line. It is the intention of the operators to maintain a monthly service with more frequent sailings if the tonnage offered warrants.

Foreign Lines Are Active

The Swedish-American line begins its new freight service from Philadelphia to Sweden and Finland this month. The line will have fortnightly sailings between Philadelphia, Gotenburg, Sweden, and Helsingfors, Finland. The Norway, Mexico & Gulf line has also re-established its weekly sailings from Philadelphia to Stavenger and Christiania.

The new French-Canadian steamship service between Montreal and France has been inaugurated. The operating company is known as La Compagnie Canadienne Transatlantique. The line is the outgrowth of an agreement between Cie Generale Transatlantique, of Paris, and the Canada Steamship Lines, Ltd.

The Cunard line has established its freight service between Bristol and Philadelphia. The KEEMUN was the first ship dispatched. A monthly service will be maintained. The Cunard line has acquired four more freighters. Three are 9600 tons deadweight each and will be named the VARDULIA, VASCONIA and VIRGILIA. The fourth vessel, the VERBANIA, is 8500 tons deadweight capacity. They will all be used in the transatlantic trade.

English lines, according to authentic reports, do not contemplate building new leviathans. The White Star line had under construction the HOMERIC when the war broke out, but apart from this single exception the building of great liners is not in contemplation by any British company.

Bottoms are in Demand

An unprecedented demand exists for vessels to carry cargo from north Pacific ports to Great Britain and Europe. Space is being sought particularly for lumber, railroad ties and barley. An enormous trade would now be moving were the tonnage available. Spot vessels are being eagerly snapped up at high freights and many others could be fixed. As high as $55 per 1000 feet is being paid for ties to United Kingdom and there are many cargoes of this material and lumber yet to move. Lumber exporters are anticipating an immense export business to Europe and England and are entertaining a strong hope that ships will be attracted to this route.

The British government has made heavy purchases of railroad ties in British Columbia, but it is impossible to allocate sufficient vessels to move this business. The score of vessels building at British Columbian yards for the French government will have cargo furnished by the British government and it is assumed that they will be used for carrying the ties and other railroad material in question.

A disposition has developed on the part of United States officials to permit the assignment of new wooden steamers to the European route. Heretofore, these vessels were reserved for government business and several cargoes of ties for Atlantic ports have already been dispatched on this fleet. However, it is now announced that much of the material bought for the United States roads will be moved overland by rail, thus releasing the wooden steamers for other routes.

Prefers Government Freight

Considerable barley is offering for export from San Francisco and from $38 to $40 per ton is being paid for space to the United Kingdom and to Scandinavian countries. General cargo is also being offered in quantities for shipment to Europe but this business is being handicapped by lack of space. The regular steamship lines are still giving preference to government freight and are unable as yet to obtain a sufficient number of vessels to handle what is offering. There is every indication of a very brisk trade with European and British ports as soon as vessels are available. The same is true of the prospects for the coast-to-coast business but the large companies cannot offer regular sailings yet.

The transpacific situation shows little change. There was a disposition to cut rates from the $12 basis recently established. However, the companies in the Pacific conference recently agreed to maintain this level and as a rule this is being done, although it is reported that a quantity of steel was booked at as low as $8. Practically no freight is moving from the Orient to this coast at present and the exports are being confined largely to steel, cotton and lumber. Several cargoes of railroad material have been dispatched to Vladivostok but there is no indication that the Siberian business will continue permanently in volume.

Charter Rates Still High

Movement of lumber and cereal from Boston, the former to Argentina, France and Belgium and the latter to England and, in fact, to most of western Europe, is becoming heavier with ampler supply of tonnage. Freight rates are at the crest in case of lumber, charters from Boston to Buenos Aires and Montevideo standing at the high-water mark of $50 per thousand feet. This rate is being taken advantage of by sailing vessels, the ships and barks with capacity of from 1,000,000 to 1,500,000 feet, averaging the passage of 6000 miles in about 75 days while the schooners require a trifle longer time, as a rule. Shortly before the war the freight on lumber was $8.25 per thousand and owners considered the figure fairly remunerative. The freight on lumber to France and Belgium, mostly Canadian white pine, is proportionately as high as that collected for South American ports and steamers are taking more lumber as part cargo than heretofore. Cereal, principally wheat, is going overseas in volume with Russia getting an occasional consignment. The bulk, however, is destined to Belgium, France and Germany and the rate is in the vicinity of $1 per hundred pounds. Exports from Boston to Cuba fill two steamers weekly with potatoes, paper, machinery, etc.

Oil Gains Importance as Ship Fuel

An Important Development in Vessel Propulsion is Under Way—What The Government did to Standardize Oil Burning on Merchant Ships

By V. G. Iden

FUEL oil, as a maritime problem, is peculiarly America's own. The English navy first adopted oil as a fuel and for that reason the supply was of grave importance during the war. But until the United States became involved, and the shipping board began its shipbuilding program, fuel oil was of little consequence in the merchant marine field. The great change that has come about is disclosed by the statement of the shipping board that the estimated consumption of fuel oil by American merchant ships during the current year will exceed 20,000,000 barrels. This is approximately one-tenth of the total domestic production.

According to the testimony of many shipping experts, private vessel owners were not induced to adopt oil as a fuel in the past because of their inability to obtain long-time contracts with oil companies. An elaborate system of coaling stations had been built up throughout the world and that, undoubtedly, had great influence on the situation. In addition, England owned most of these coaling stations and many of the vessels in which Americans were interested were built in British yards.

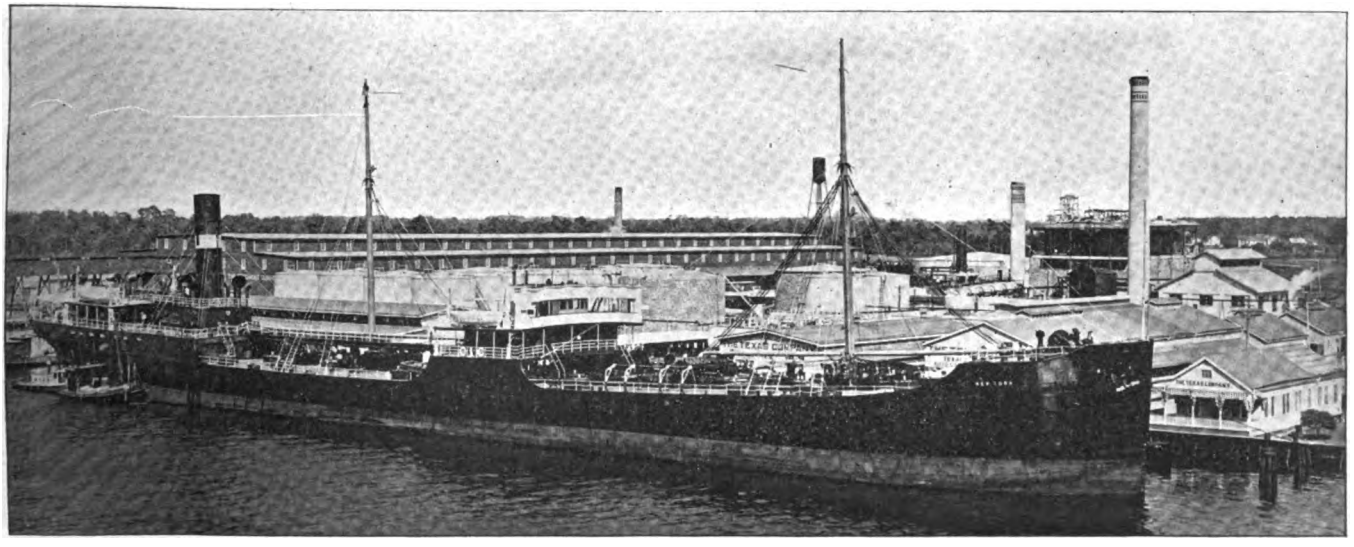
Just prior to the armistice, the shipping board set to work to make an estimate of the fuel oil needs of the merchant fleet. Based upon the deliveries of new vessels, and the expected deliveries during 1919, the board calculated that at least 28,000,000 barrels of fuel oil would be required. Contracts for a great part of this have been let. The bulk of the fuel oil contracted for by the shipping board during 1919 will be purchased at prices varying from 98 cents to $1.25 per barrel. The bids submitted by the Atlantic coast companies varied greatly, but indicated an anxiety on the part of the companies to obtain the business. The bids submitted on the Gulf coast were lower because of the heavy holdings of Pine island crude when the armistice was signed. The Pacific coast quotations were higher because the fuel oil demand there has been consistently steady, while the close of hostilities did not cause the banking up of supplies in any such degree as was the case on the eastern and southern seaboards. The eastern and southern bidders also had the advantage of the backing up of the Mexican oil supply.

How Data Was Compiled

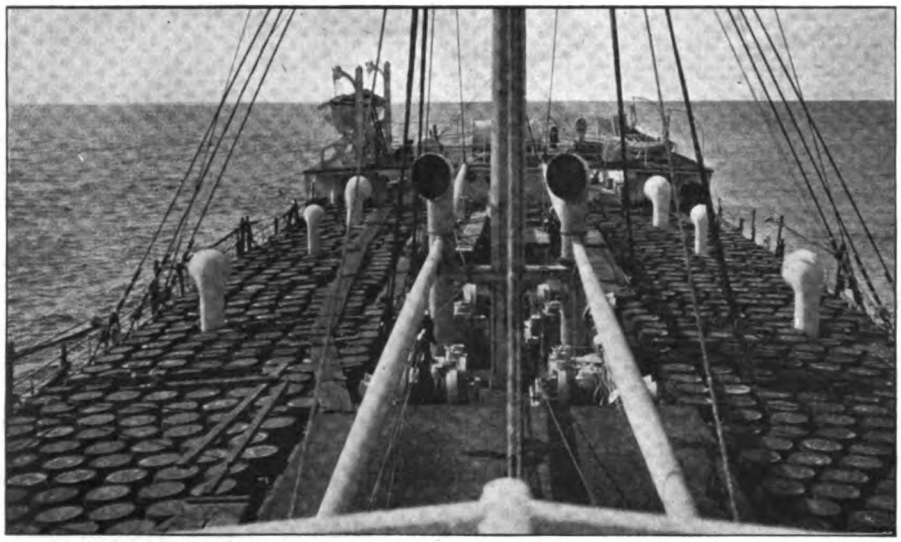
In arriving at the estimated needs of the merchant ships for fuel oil, the experts employed by the shipping board calculated that, assuming the highest efficiency for the ships and good installations, a ship will burn 1.1 pounds of oil per horsepower hour. It was assumed, under war conditions, that a ship will be at sea 60 per cent of her time, and that while in port she will burn but 21 per cent of the oil burned at sea. Upon this basis a ship would be burning approximately 68 per cent of her maximum capacity during the entire year. The production of fuel oil during 1918 has been estimated at 200,000,000 barrels, in round figures, the greater proportion having been consumed by the navy. Should this much fuel oil be drawn from our oil deposits consistently each year, oil men figure that the supply will be depleted within 30 years. A good ship will last from 20 to 25 years, and while the supply of oil would hold out that long, the price would certainly mount so high as to make oil-burning merchantmen unprofitable.

It is believed by oil men that the radical industrial adjustment is certain to come about within the next 20 years, and that in the future fuel oil will be largely, although probably not exclusively, used as a marine fuel. For instance oil has been used in some brick kilns until the price mounted so high as to make it unprofitable.

Despite the uncertain factors in the future use of oil as a fuel, the matter must be measured in dollars and cents. The relative cost of oil and coal is today approximately equal. It has been estimated by fuel engineers that one ton of oil will produce one-half again as much heat as one ton of coal. The price of oil, therefore, might advance considerably or the price of coal drop before the economy of fuel oil on a ship is wiped out. But, in addition to this, by the use of oil-burners, a vessel can reduce her fireroom crew by approximately



NORFOLK TERMINAL OF THE TEXAS CO. FROM VIRGINIA RAILROAD BRIDGE—STEAMER IN THE FOREGOUND IS THE NEW YORK, A MODERN STEEL TANKER



VIEW OF THE GEORGE WASHINGTON SHOWING HOW A DECK CARGO OF OIL IS STOWED

one-third. The saving in wages can therefore well be added to other economies.

Other advantages are found in the use of fuel oil in marine work which are not present in land work. The bunker can be stored in peak tanks, double bulkheads, double bottoms, thereby increasing cargo space. That is an economy in fuel consumption which A. P. Allen, an engineer in the employ of the shipping board, has explained as follows:

Must Consider Carrying Capacity

"In comparing the relative cost of oil in connection with oil-burning boilers and coal, consideration must be given to increased cargo carrying capacity of the vessel, which in a 10,000-ton deadweight ship amounts to 800 tons on a 7000-mile voyage. This gives the vessel an additional freight capacity of 800 tons, which, on the basis of $50 a ton, amounts to a saving of $40,000 against an increased fuel cost of $3500, showing a credit of $36,500 in favor of oil burning with reciprocating or turbine engine over coal burning, or sufficient to pay for all the fuel used on two and one-half voyages. A comparison of the relative quantity of fuel required, showing the increased freight carrying capacity by the reduction in quantity of fuel necessary to carry a 10,000-ton deadweight vessel on a transatlantic voyage of 7000 miles, is as follows: Coal, 1600 tons fuel oil burning boilers, 800 tons; diesel engines, 260 tons."

Some shipping men have expressed the opinion that the internal combustion engine will be the medium of merchant marine propulsion in the future. Obviously, this depends largely on the success met in applying this type of engine to large vessels. Engineers of course agree that this engine is an economical consumer of fuel.

At the present time, fuel oil is selling for approximately $1 per barrel. This is a crude product with the gasoline distilled off. A diesel engine, however, must have a gas oil; a product intermediate between kerosene and heavy oils. Such an oil today costs approximately $2.75 per barrel. Taking into consideration the mere matter of relative prices, it would appear that it is more expensive to operate a diesel engine today than oil-burning boilers. But consideration must be given to increased cargo carrying capacity and reduction in the size of the crew.

The shipping board has summarized the advantages of oil fuel as follows:

"A ton of oil takes 5 cubic feet less space than a ton of coal and gives 80 per cent steaming efficiency against 65 per cent for coal.

"There is a 40 per cent saving in bunker space, which is made available for cargo in a freighter.

"There is a saving in quarters for the crew, because an oil-burning ship carries fewer men. Estimates for the MAURETANIA give a fireroom force of 27 men for oil burning as against 312 needed to burn coal.

Oil Gives Good Control

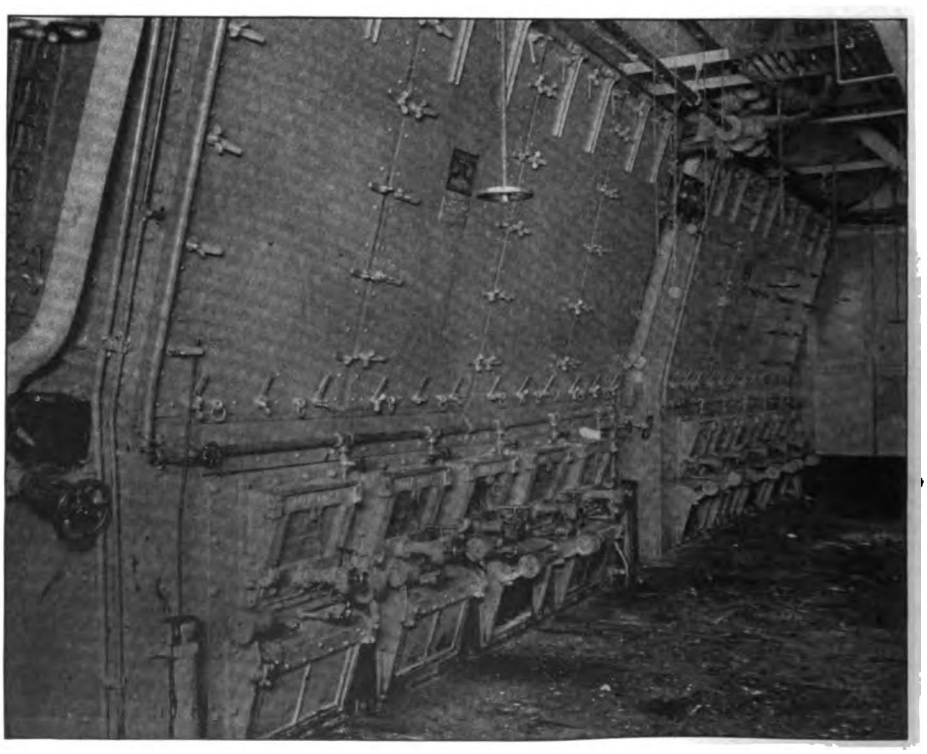
"Oil-burning vessels will make from 10 to 20 per cent more mileage than coal burners.

"There is better control of steaming, because fires can be started and stopped instantly, steam raised quickly, and time in port saved through the greater ease of taking on oil as contrasted with coal.

"There are also other advantages. Oil is often cheaper than coal in actual dollars—prices vary widely, of course. Oil does not deteriorate in storage like coal. Oil eliminates the fire risk from spontaneous combustion in coal, and is not subjected to the danger of shifting in a rough sea.

"The oil burner has a radius of from two to three times that of the coal burner.

"The motorship will operate on about half as much oil as the oil-burning steamer. Its engineroom force is reduced still more—from one to three men are sufficient; and there



HOW THE FIREROOM ON AN OIL BURNER LOOKS—A SMALL FIREROOM CREW IS REQUIRED

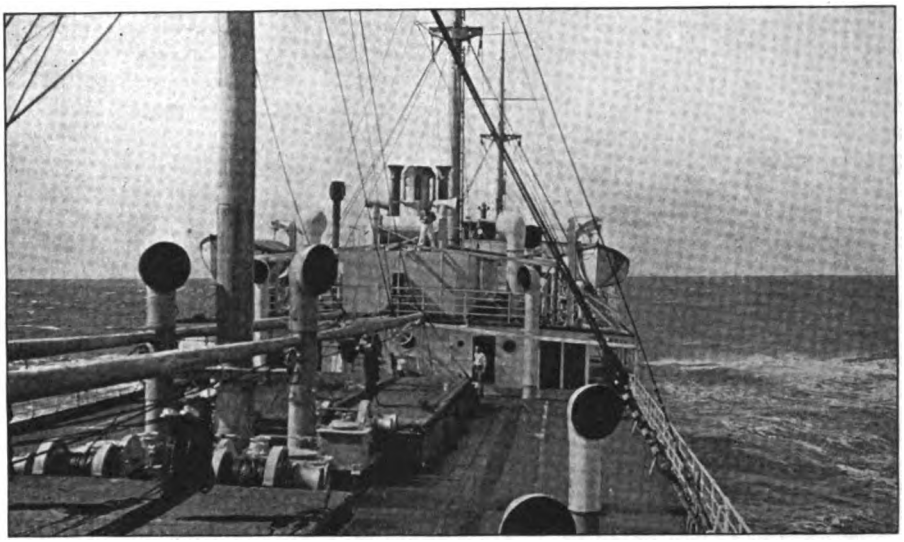
are no stokers, for the motorship's mechanical staff is made up of skilled men. A Danish motor liner, the FIONA, recently went clear around the globe, making a voyage of 32,000 miles, with only one engineer.

"The largest motorship yet built, the GLENAPP, recently made her trial trip in Scotland. She is 10,000 tons deadweight, with two sets of diesel engines, 6600 horsepower. It is estimated she can make from 12 to 14 knots an hour and run from London to Australia and back more than half way without replenishing fuel."

Fuel oil is today a most important bunker fuel for merchant ships in the overseas trades. During the seven months from June to December, 1918, inclusive, the war trade board issued licenses to merchant ships clearing for foreign ports to bunker over 4,500,000 barrels of fuel oil, as against coal bunker licenses slightly in excess of 2,900,000 tons. The average monthly bunkering of fuel oil during these seven months was approximately 650,000 barrels. The relative consumption of fuel oil and of coal as bunker remained almost constant.

Huge Tanker Program

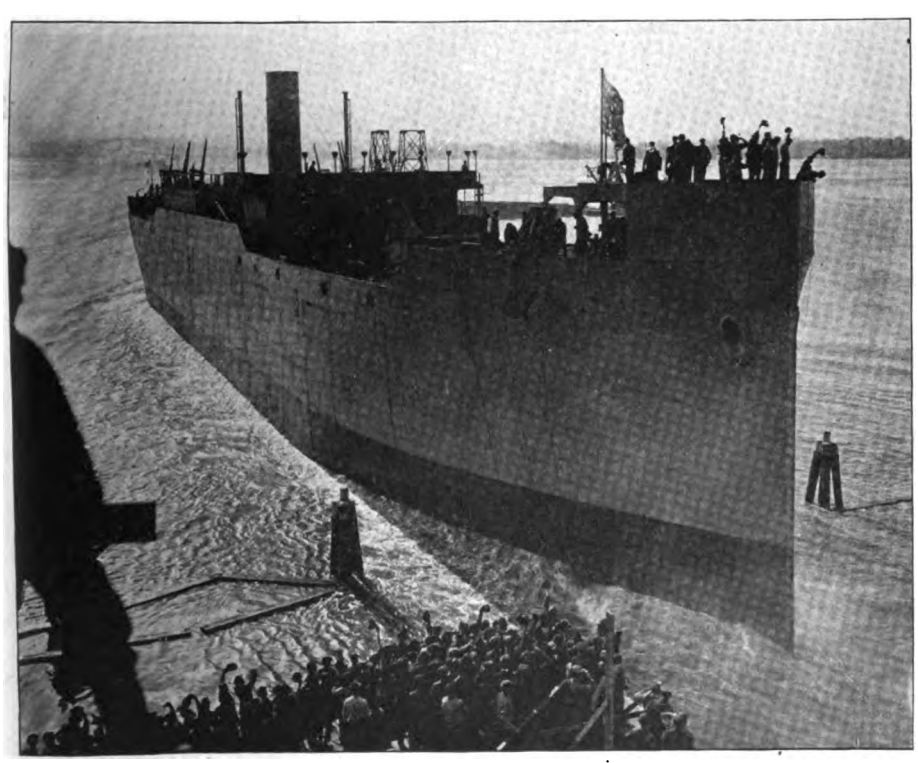
Not until the war trade board levied its restrictions on bunkering were any accurate statistics kept of the amount of fuel consumed on merchant ships. Practical shipping men have for some time recognized the merit of fuel oil as a bunker but have not undertaken to accept it generally for many reasons. In the first place, it was thought to be almost impossible to obtain fuel oil on all the ocean runs that must be traversed. Coal bunkering stations were well established and this lack of oil bunkering stations was thought to mitigate against the easy charter of a vessel built to burn oil. The shipping board, realizing the needs of the future, projected a comprehensive tanker building program. Forty steel tankers of 402,710 tons have been completed since the entrance of the United States in the war. The completed program calls for 58 tankers of 560,230 tons. Contracts upon which work has not started will bring this total up to 156 tankers of 1,463,230 deadweight tons. Each one of these tankers is capable of transporting oil sufficient to displace approximately 21,000 tons of coal. Each can make three trips every two months from Mexico to American seaboard ports.



LOOKING FORWARD ON THE GEORGE WASHINGTON—SHE IS POWERED WITH DIESEL ENGINES AND REGISTERS 9400 TONS

With fuel oil at Tampico, Mex., selling around 24 cents and at the American seaboard for $1.38 per barrel, it is easily seen that the new fleet of tankers will not only greatly simplify the question of bunkering stations but will tend to equalize and stabilize the price of oil bunker throughout the western hemisphere. Although some limit is seen to the sources of oil in the United States, it is contended that the potential supply in Mexico is almost unlimited.

If permitted to carry out its program, the shipping board will also simplify the bunkering problem greatly by the establishment of strategic bunkering stations. It intends to construct oil storage facilities at Boston, Philadelphia, Galveston, Colon and Cristobal. These will cost approximately $5,000,000. The oil companies themselves are engaging in this same line of constructive extension. They have already established many important stations along the American seaboard. At the same time some shipping companies have invested in the oil fields.



LAUNCHING THE SACANDAGA AT HOG ISLAND—THIS VESSEL IS EQUIPPED WITH OIL BURNING BOILERS

What is Fuel Oil?

The experience had with fuel oil during the period of the war has further tended to clarify the definitions. This was undertaken first by the navy department which is a large consumer of this bunker. The tests and specifications of the navy have been extended to merchant vessel

usage by the shipping board. Following are the methods of testing and the specifications covering fuel oil, gas oil, and bunker oil for Atlantic and Gulf ports, as adopted by the government:

"Methods of Test—(a) Flash point will be taken as indicated in the specifications.

"(b) Viscosity will be taken by the distillation method. When oil in small lots is consigned to naval vessel or to navy yards the centrifuge test will be used in order to obviate delay. In this test 30 cubic centimeters of oil and an equal quantity of best commercial benzol, 50 per cent white, will be used, and the mixture heated to 100 degrees Fahr.

"Specifications—(a) Fuel oil shall be a hydrocarbon oil free from grit, acid, and fibrous or other foreign matter likely to clog or injure the burners or valves. If required by the navy department, it shall be strained by being drawn through filters of wire gauze having 16 meshes to the inch. The clearance through the strainer shall be at least twice the area of the suction pipe and strainers shall be in duplicate.

"(b) The unit of quantity to be the barrel of 42 gallons of 231 cubic inches at a standard temperature of 60 degrees Fahr. For every decrease or increase of temperature of 10 degrees Fahr. (or proportion thereof) from the standard, 0.4 of 1 per cent (or prorated percentage) shall be added or deducted from the measured or gaged quantity for correction.

"(c) The flash point shall not be lower than 150 degrees Fahr. as a minimum (Abel or Pennsky-Marten's closed cup) or 175 degrees Fahr. (Tagliabue open cup). In case of oils having a viscosity greater than 8 Engler at 150 degrees Fahr. the flash point (closed cup) shall not be below the temperature at which the oil has a viscosity at 8 Engler.

"(d) Viscosity shall not be greater than 40 Engler at 70 degrees Fahr.

"(e) Water and sediment not over 1 per cent. If in excess of 1 per cent, the excess to be subtracted from the volume; or the oil may be rejected.

"(f) Sulphur not over 1.5 per cent.

"Note—If the Engler viscosimeter is not available, the Saybolt standard universal viscomimeter may be used. Equivalent viscosities are:

" 8 Engler— 300 seconds Saybolt.

"40 Engler—1500 seconds Saybolt.

"Bunker oil A—To comply strictly with the provisions for navy specifications fuel oil, except that there shall be no limit on sulphur.

"Bunker oil B—Specifications to be the same as for navy fuel oil except:

"(c) Omit and substitute: The flash point shall not be lower than 150 degrees Fahr. as a minimum (Abel or Pennsky-Marten's closed cup) or 175 degrees Fahr. (Tagliabue open cup).

"(d) Omit and substitute: To have a minimum gravity of 18 Baume.

"(f) This item to be omitted.

"Bunker oil C—Specifications to be the same as for bunker oil B except it is to have a gravity of approximately 16 Baume.

"Navy standard fuel oil will be supplied to battleships, destroyers and other vessels subject to heavy forced draft conditions or required to run smokeless. It will also be supplied for cargo oil for all shipments abroad or to navy storage.

"Bunker oil A will be used by other types of vessels requiring a light oil and by shore stations fitted with separate storage for yard use. It will not be used where bunker oil B or C can be satisfactorily used.

"Bunker oil B will be used by all transports and cargo vessels which can satisfactorily burn an oil not heavier than 18 Baume gravity. It will not be used where bunker oil C can be satisfactorily used.

"Bunker oil C will be used by all transports and cargo vessels which can satisfactorily burn an oil of approximately 16 Baume gravity.

"The commander, cruiser and transport force, or his representative, and the district supervisor, naval overseas transportation service, shall determine the grade of oil to be used by vessels operating under their direction."

The cargo carrier GEORGE WASHINGTON, which is powered with diesel engines, made a round trip voyage from San Francisco to the Orient without rebunkering, the distance covered being 14,000 miles. She docked with several weeks' supply of oil on hand.

Advocates Government Control of Ships

(A letter to the Editor of The Marine Review)

THE problem of American shipping is so great and must be viewed from so many different angles that it is impossible for any one, even though gifted with omniscience, to know it all. From the many articles which have been written on the subject, the one who is seeking for light and who is earnestly and honestly desirous that plans which will really build up an American marine and American trade should be adopted and put into effect, becomes hopelessly confused.

From all the conflicting ideas, however, there stands out clearly some facts:

1.—The necessity for a large merchant marine under the American flag is conceded by all if the farms and factories of this country are to have a continuous and healthy growth, and if the financial interests of the nation are to undertake responsibilities and privileges which have been forced upon them in the past five years.

2.—The old shipping interests and their connections are firmly opposed to government ownership of ships, to government control of rates or of operations.

3.—That it costs more to build and operate a ship under American registry than it does under the registry of many of our principal competitors in the race for world trade.

4.—Not so clearly shown, but still plain, shippers are beginning to realize the necessity of having ocean rates and service which will place them on an equality with other European competitors in reaching the southern and far eastern markets.

American experts, who have managed American shipping companies in the past, pin their faith to the old order of affairs and demand private ownership and operation of vessels with the least possible control or direction from the law and maximum freedom from regulation by governmental authorities even in the management of the ships or in the rates to be charged for service performed by them. But they claim that, owing to demands of American labor, both at sea and ashore, the privately owned marine cannot exist under competition with the less costly ships and labor of European and far eastern countries. They demand, therefore, assistance from the government to meet this condition.

The American people in the past have stood steadfastly against a subsidy to ships in any form or shape. There is nothing to indicate that, as far as giving assistance to the privately owned marine, this feeling has changed. It is the fashion to rail at congress and legislatures but in the main these men gage correctly

the feelings of the people whom they represent—if they did not do this they would soon cease to represent them in congress and the continuous and overwhelming opposition in Washington to ship subsidies undoubtedly represents the views of the American people. No amount of urging or argument by shipowners will change the opinion of congress on this subject unless it first changes the opinions of the people.

The necessity for ships has, however, been so evident in the past five years that the people are awakened to the need for a merchant marine and the ready support and immense sums granted cheerfully by congress to the building of government ships is a sufficient indication of the feelings of the people on this subject—in other words, they are in favor of a government owned merchant marine. Whether they will continue in this frame of mind after the problems of government ownership and operation have been worked out, can only be developed in time and by the success or failure of such plans. It may be taken for granted that at this time no proposition leading to the giving up by the government to private ownership of the immense merchant fleet which it owns will be approved by the public.

That this will work a hardship to the American shipowner cannot be denied, but if his contention that a government owned marine cannot be as cheaply or efficiently operated as can the privately owned ships, the hardships may not be as great as some of the advocates of that system would have us believe.

We are not a seafaring nation and the conditions and motives which have influenced England and Germany in the upbuilding of their marine do not apply to us. We are dependent upon the sea for prosperity but not for our daily bread—our people are interested in the sea for protection from attack by other countries and as a highway for trade. We are apparently willing to advance trade by means of government owned ships and to pay a subsidy to those ships by carrying freight at less than cost when this is done for the benefit of the whole people, but we are not willing to do it when it is done in the interests of any class, even so powerful and influential a class as the shipowners. The public points to the fact that the American marine has not been successful as measured by the upbuilding of the industry in the last 60 years under private ownership and management and that our marine has steadily decreased, except where it was protected from competition by the coastwise laws or on the Great Lakes, and they are disposed to regard with considerable suspicion the experts in the shipping industry who are advocating the sale to private interests of the great fleet built at so great a sacrifice of money and materials. Inasmuch as the people pay the freight, they have the right to say to whom they shall pay it and in what manner it shall be paid.

Trade demands regular sailings, carrying any sized packages, from a toothpick to a locomotive and pursuing a definite course for some years and giving to each shipper, great or small, equal service and at the same cost. Industry demands this and will not be satisfied with less.

Must Establish Agencies

If ships are to make these voyages (and the day of tramp steamers as an adjunct to trade is past) agencies must be established in foreign ports for handling these ships, for distributing the outward bound cargo and for gathering cargo for the homeward voyage. The ship that only carries cargo one way will be as profitable as a railroad which only carries freight one way and ships without cargo are as valuable as a railroad wthout traffic. The building up of such a system is one upon which the advocates of government owned and operated and privately owned and operated ships could agree—such a system, organized and controlled whether by the department of commerce or by the shipping board, with agencies in every principal port in the world could be and should be installed and managed at government expense. It should not be a charitable institution, but a sufficient sum should be charged the ships and the patrons of the ships to make it self-supporting. The agencies which produced more than enough for their support should contribute to the weaker ones which were necessary for commercial purposes—they should be open to all ships, whether of this or other countries, but their first duty should be to the American flag and the American ship. Without such agencies no marine can do its best work, and with such agencies the chances for a government owned and operated marine would be greatly enhanced. They should be responsible only to the government, for they should be the fingers with which trade for all is grasped and they should work in harmony with every American interest.

(Signed) Frederick B. Lynch,
President, Foreign Transport &
Mercantile Corp., New York.

Book Review

Ship Stability and Trim, by Percy A. Hillhouse; cloth; 297 pages, 5¼ x 8½ inches; published by John Hogg and furnished by THE MARINE REVIEW for $4.50.

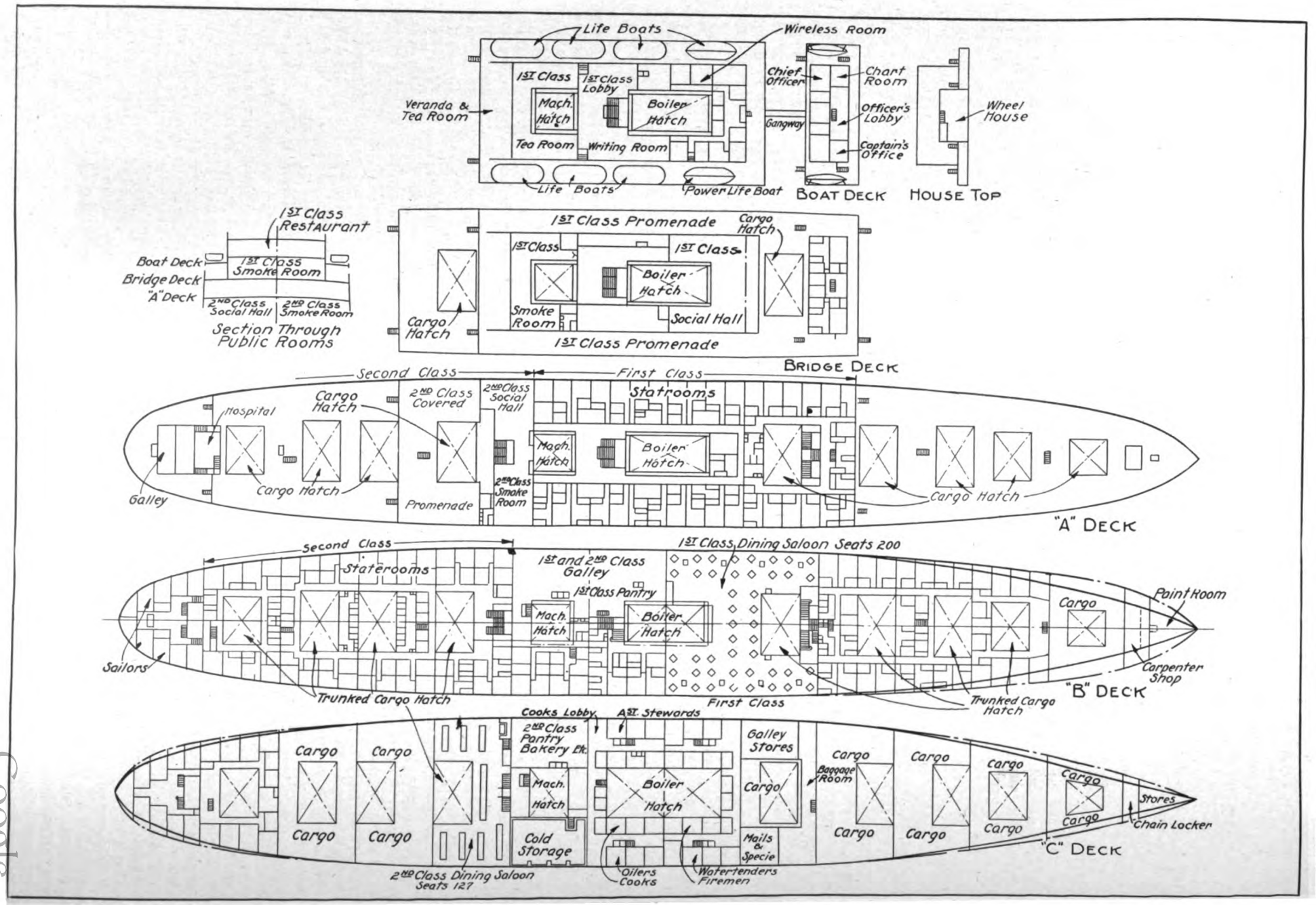
The author sets forth that it was his intention in writing this book to treat the problems of stability more fully than is possible in a work covering the complete field of naval architecture. A large amount of complicated, mathematical work has gradually grown up in connection with the geometrical side of stability problems and many theorems have been established. In the present work, however, all academic investigations have been omitted and the author has confined his attention to what is necessary for the practical demonstration and understanding of the positions and movements of the center of buoyancy for all conditions of draft and inclination.

It is pointed out that the cargo vessel of other days with poop bridge and forecastle has been superseded by vessels with higher superstructures which makes it imperative that the problems of stability of such vessels be thoroughly understood.

The book carries a concise description of flotation and equilibrium in which the properties of water, the laws of flotation, displacement, etc., are fully described. Several line drawings are included throughout the book to make the subject as clear as possible. The stability of floating bodies and stability calculations are next treated and their practical application to ships described. The metacenter comes in for a lengthy description. The effect of wind pressure on a modern vessel is fully described and the center of gravity is thoroughly explained. Many examples and tables are included in the book together with a list of the definitions used.

The student of naval architecture as well as others engaged in shipbuilding and ship operation will find this book of value in seeking a solution to the many complex questions arising in connection with stability problems. The author uses clear language that is readily understood by the layman.

The National Life Preserver Co., New York, is issuing a bulletin which contains portraits of Harry G. Hawker and Lieut. Commander Mackenzie Grieve and their statement regarding the use of the company's life preserver suits in the recent transatlantic flight. This statement covers both conditions of cold met at high altitudes and when in the ocean after dropping to the sea.



DECK PLANS OF REDESIGNED SHIP BUILT FOR THE EMERGENCY FLEET CORPORATION BY THE NEW YORK SHIPBUILDING CORP.—THIS VESSEL IS A COMBINATION PASSENGER AND CARGO SHIP

Commerce Absorbs Transport Ships

Thirteen Vessels Planned for the War Emergency Have Been Redesigned to Carry Freight and Passengers—Largest Vessels Now Being Built

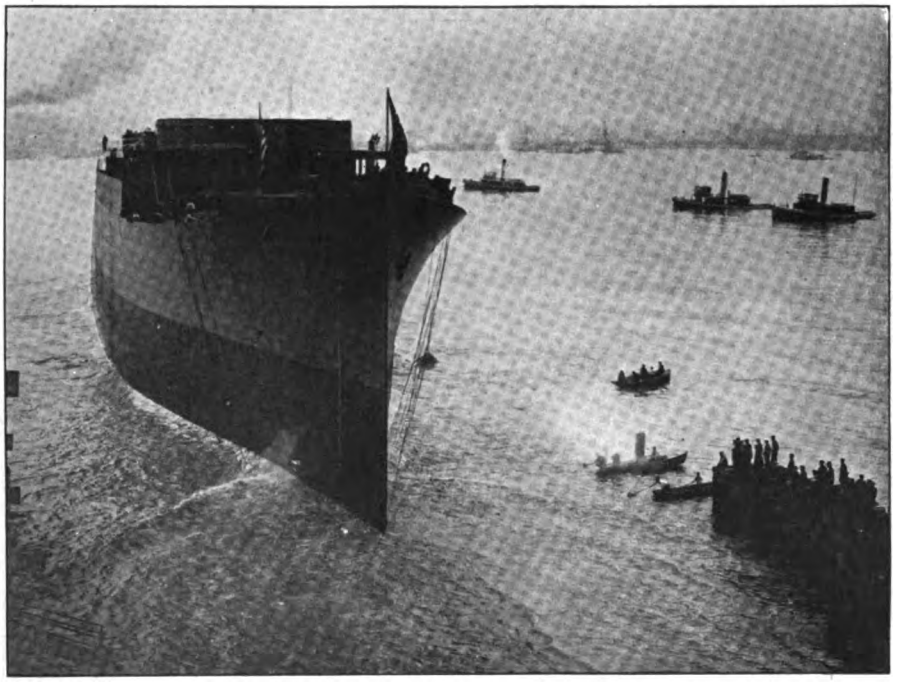
ON May 24, the largest vessel ever built for the shipping board, was launched at the Camden, N. J., yard of the New York Shipbuilding Corp. The vessel is the WENATCHEE, and is the first of a fleet of 13 similar ships originally designed for transporting troops to France. The coming of the armistice brought about a change in the plans. The vessels, as finally approved by the engineers of the Emergency Fleet corporation and the New York Shipbuilding Corp., are combination passenger and cargo steamers having a deadweight tonnage of 13,000. The New York company will furnish nine of these vessels, two will be built at the Sparrows Point, Md., yard of the Bethlehem Shipbuilding Corp., and two by the Newport News Shipbuilding & Dry Dock Co.

The details which follow are the first to be published describing the new design of these ships. The revised plans call for combination passenger and cargo boats, 535 feet long, 72 feet beam, and 50 feet deep. The original plans called for transverse framing, and the revised plans call for longitudinal framing. When completed, they will be capable of carrying 243 first-class, and 224 second-class passengers. The crew will number 193, of which 39 are seamen. The engine room and fire room crew number 40 while 114 are under the steward. The length of the vessel, according to Lloyds measurement, will be 518 feet. The depth to *A* shade deck is 50 feet, to *B* shelter deck 41 feet, and to *C* upper deck is 32 feet. The designed draft is 30 feet, and corresponding displacement 20,800 tons. The vessel, equipped with 4500-horsepower engines will log 16 knots, and when equipped with 6000 - horsepower engines will make 17½ knots. The vessels are designed to carry a total deadweight cargo of 10,000 tons in addition to about 2600 tons of fuel, fresh water, stores, etc., on a mean draft of 30 feet and to maintain a sea speed of 16 knots, with reserve power to obtain a speed of about 17½ knots when light loaded or in ballast.

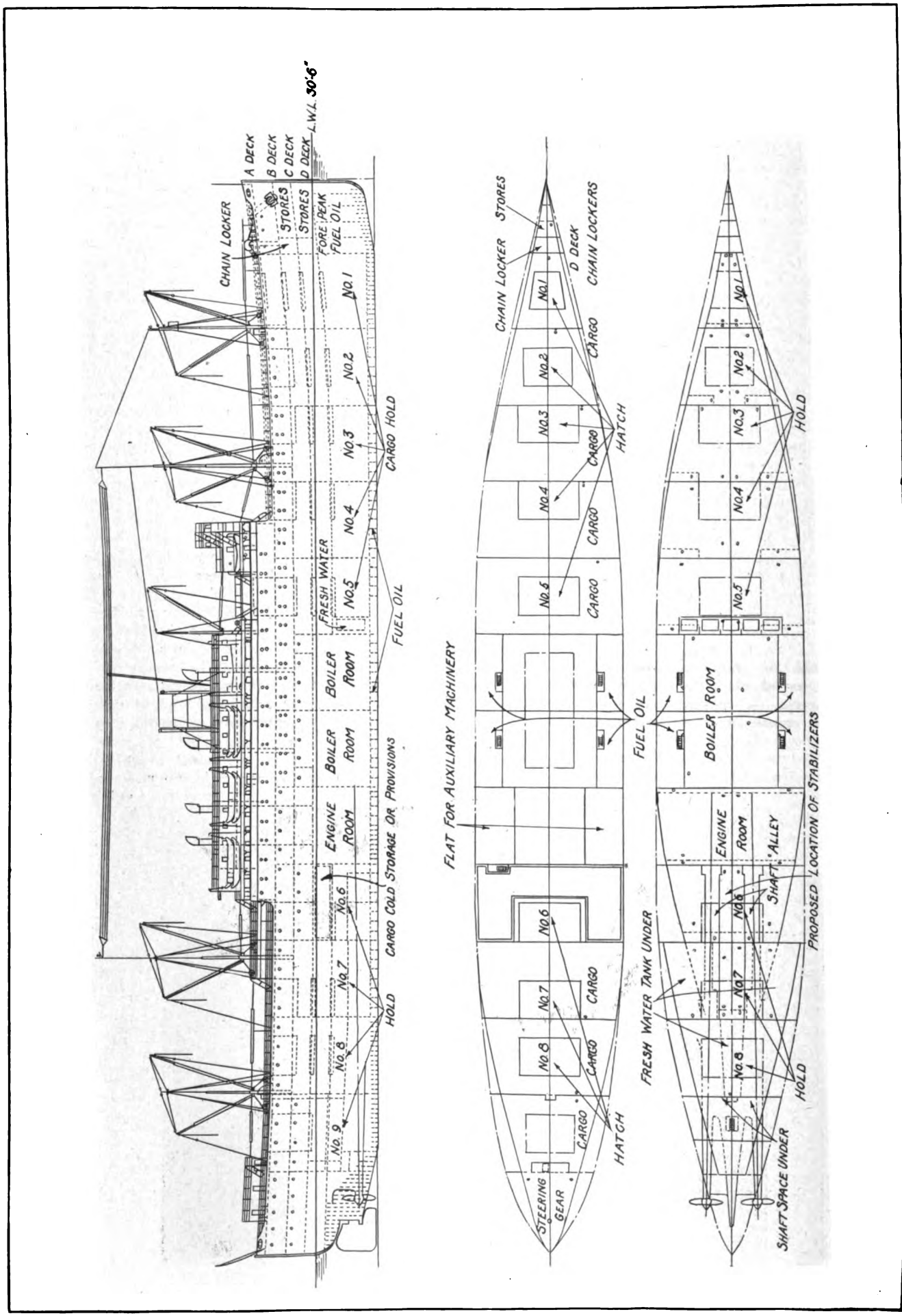
The description of this type of vessel, as carried in the builders' specifications, follows:

The vessel will be a steel, twin screw, shelter deck type (with full shade deck) steamship with a straight stem and cruiser stern. There will be four complete steel decks to the hull consisting of *A* deck, *B* deck, *C* deck and *D* deck, and a double tier of steel deckhouses amidships. The top of both deckhouses will be carried out to the sides of the vessel to form promenade and boat decks. On the boat deck there will be a wood wheelhouse, and chart room forward and a similar house for wireless will be located aft. A flying bridge will be fitted at the level of these houses at each end of the superstructure. There will be a double bottom extending from the fore peak to the after end of the shaft tunnels and divided transversely into 12 compartments, the compartment under the engine-room arranged to carry boiler feed water only and all other compartments arranged to carry fuel or water ballast. The vessel will be subdivided by 13 transverse watertight bulkheads all extending up to the *A* deck. This subdivision will give five cargo holds forward and four aft of the machinery, which will be located amidships in three compartments, two for boilers and one for engines. Wing bulkheads will be fitted up to the *C* deck throughout the boiler compartments to form side tanks for fuel oil. Wing bulkheads will also be fitted well outboard in the engine room. All accommodations for officers and crew will be located in the deckhouses.

The compartments abreast the boiler casings on the *C* deck, and abreast engine and boiler casings on the *B* deck will be insulated and arranged for carrying refrigerated cargo and ship's stores. One hatch will be fitted on each side of the vessel to each of these compartments and each hatch will be served by a hatch crane at the side of the vessel. Each of the regular cargo holds will have one large hatch in all decks and each hatch will be served by two cargo booms located at derrick masts, the latter arranged to hinge down. Two single-drum, single-geared winches will be provided at each hatch, each of which will handle one boom. There will be no masts of the standard type, but a light steel mast with housing topmast will be fitted at the side or arranged to telescope into the smokestack to carry wireless antennae and the headlight. The propelling machinery will consist of two sets of geared turbines and eight water-tube boilers. The boilers will be divided into two sets of four each located in separate watertight compartpartments, but all connected to one stack. The hull will be bossed for twin screw shafts.



S.S. WENATCHEE ORIGINALLY DESIGNED FOR TRANSPORT DUTY BUT WHEN LAUNCHED RECENTLY BY THE NEW YORK SHIPBUILDING CORP. REFITTED TO CARRY PASSENGERS AND FREIGHT



PROFILE, DECK AND HOLD PLANS OF THE 13,000-TON AMERICAN-BUILT PASSENGER SHIP—THIS TYPE VESSEL IS POWERED WITH TURBINE ENGINES AND LOGS 18 KNOTS WHEN LOADED—WHEN IN BALLAST SHE CAN MAINTAIN A SPEED OF 17½ KNOTS

The vessel will have an electric lighting plant, auxiliary lighting and wireless power plant, refrigerating plant for ship's cold storage and refrigerated cargo, steam steering gear, steam windlass, steam capstans, and steam heating system.

Bunkers for fuel oil will be fitted at the sides of the boiler rooms between double bottom and second deck. They will be of the usual oil-tight construction and will be fitted with swash plates as necessary.

The water-tube boilers will have a heating surface of 40,000 square feet, using oil fuel by means of the mechanical oil burning system under induced draft. The boilers will be designed for a working pressure of 265 pounds per square inch and 75 degrees Fahr. superheat. The induced-draft fans will be located in the uptakes and be driven by slow-speed reciprocating engines or geared turbines. There will be two surface condensers, two centrifugal circulating pumps, two air pumps, two main feed pumps, one auxiliary feed pump, one fire and bilge pump, one engine room bilge pump, one fire room bilge pump, one sanitary pump, one ballast pump, one fresh water pump, one drinking water pump, two lubricating oil pumps, one oil cooler pump, one fuel oil transfer pump, four fuel oil pressure pumps, two injectors, one feed water heater, one auxiliary condenser with combined air and circulating pump, one feed and filter tank, three 50-kilowatt generators with one switchboard, evaporator, waste and soda tanks, water coolers, oil coolers, engineer's stores room, workshop, together with such other auxiliary machinery and outfit as is necessary for the proper operation of these ships.

The hull machinery consists of steam windlass, steam capstan, steam and hand steering gear, steam winches, ice machines, mechanical ventilating and heating, auxiliary lighting and wireless plant, deck pumps, etc.

The main turbines will be of approved make, each capable of developing 6000 shaft horsepower at 120 revolutions a minute of the propeller shaft and connecting to the main shaft by double helical gearing. A backing turbine will be incorporated in the same casing as the ahead turbine, and when supplied with the same amount of steam as used for full load conditions, will develop not less than two-thirds of the full speed ahead torque on not more than two-thirds of the full speed revolutions per minute.

The lubrication of the turbine bearings and gears will be by oil supplied from a gravity tank located in the engine hatch. This tank will be supplied from the lubricating oil pumps, which will draw from a drain tank underneath the gears and discharge through coolers to the gravity tank. There will be two oil coolers each of ample capacity to cool the lubricating oil. Water for the cooler will be supplied by a special pump.

The propellers will be solid bronze, right hand, three blade, about 16 feet 6 inches in diameter. They will be secured to the taper end of the shafts by a key and nut.

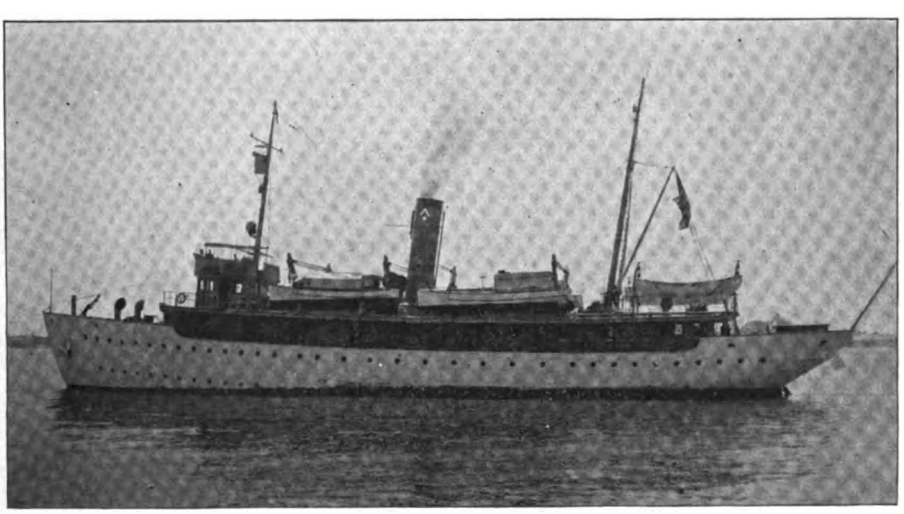
Surveyor Wins Alaska After Long Voyage

LAUNCHED at Manitowoc, Wis., in 1917, and taken to tidewater via the St. Lawrence river, then turned over to the navy and equipped with guns and depth charges, followed by a voyage across the Atlantic for convoy service in the Mediterranean and from thence to the north Pacific coast by way of the Panama canal for service in the Alaska fleet of the United States coast and geodetic survey, for which purpose she was built and equipped two years earlier, is the brief history of the SURVEYOR.

Her record in foreign waters is attested by a star and chevron on her funnel. While doing convoy duty she was attacked by two German submarines, one of which was the U-39 which sank the LUSITANIA. A torpedo fired by this craft just missed the SURVEYOR's bow. The little vessel maneuvered to a favorable position and dropped a depth charge which disabled the submarine making it necessary for her to proceed to Cartagena, Spain, at which port she was compelled to intern.

The SURVEYOR was built by the Manitowoc, Wis., during the summer of 1917. She is an all-steel vessel of 1000 tons displacement and was especially designed for work as an offshore surveying ship in north Pacific waters. She is 683 feet long with 34-foot beam and 12-foot draft. She is powered by a triple-expansion engine which develops 1000 horsepower. Oil is used as fuel and her tanks hold a supply of 75,000 gallons, giving a steaming radius of 5000 miles, running at full speed. The SURVEYOR is well equipped for the work for which she is outfitted. She has water tanks and provision storage room for a six month's voyage which enables her to keep at sea for several months at a time. To enable her crew to have fresh meat and vegetables at all times, she is equipped with large refrigerators. She carries 11 officers and 56 men. The quarters for both officers and crew are commodious, well ventilated and comfortably furnished. She is the largest vessel designed especially for survey work that has been built.

On her voyage to the Pacific, she stopped at San Francisco for fuel and after taking aboard surveying equipment at Seattle, she proceeded to the Alaskan peninsula to make hydrographic and topographic surveys along the steamer route between Kodiak, the Aleutian islands and the Bering sea. She is commanded by Capt. Francis H. Hardy, who has seen many years of service in the geodetic survey.



STEAMER SURVEYOR WHICH SAW ACTIVE SERVICE IN THE MEDITERRANEAN DURING THE WAR—SHE IS NOW IN ALASKAN WATERS

Raises Tug Sunk Nine Years Ago

Slings Were Placed Under the Hull and the Vessel Raised by Heavy Purchase Tackles—Hull Lay Deep in Mud

AFTER lying on the bottom of Mud lake for nine years, in 54 feet of water, with her hull buried in 17 feet of mud, the wooden tugboat GENERAL has been raised. The work was accomplished by T. L. Durocher, a contractor of Sault Ste. Marie, Mich., who specializes in towing, lightering and wrecking. The GENERAL, which was owned by the Great Lakes Towing Co., was sunk in a collision with the Canadian Pacific steamer ATHABASCA on Nov. 30, 1910, and for many years has been regarded as a total loss.

The GENERAL is 97½ feet long, 24 feet beam and 10 feet deep. She was built at Bay City, Mich., in 1900. She is powered with a high-pressure, double upright engine with cylinders 22-inch bore x 24-inch stroke. She carries one double firebox boiler, 11 x 14 feet. Her gross tonnage is 132.

Unusual interest is attached to the raising of the GENERAL, due to the fact that she had settled so deeply in the mud, which always makes a difficult bottom for divers to work upon. In the opinion of several wreckers, according to Mr. Durocher, it was impossible to raise her.

The vessel had gradually settled in the soft bottom of Mud lake, resting on her starboard side until the top of her rail was just level with the bottom of the lake.

The wreck was located last winter by sounding through the ice, after which the preliminary operations to raise her were begun. Following a carefully worked out plan, all connections were removed from the boiler by divers and braces were placed across the hull and also along the break. The work was then discontinued until spring.

The vessel was raised by the lighter SAINTE MARIE which is 302 feet long with 53-foot beam and equipped with derricks at each end. These derricks are 60 feet high and are equipped with 91 and 99-foot steel booms respectively. They have a lifting capacity of 60 tons each.

After the SAINTE MARIE was in position over the wreck, the boiler was removed first. Divers descended and passed slings, made of steel cable, under the boiler. The slings were connected to a 7-purchase tackle on one of the derrick booms and the boiler brought to the surface and slung aboard the lighter. During this operation, the lighter was counterweighted with rock deck ballast to keep her on an even keel. As the boiler came up, part of the house and the funnel came with it.

The next operation was to dig six deep holes, three on each side of the wreck. These were carried from 15 to 20 feet below the boat. Then by employing jets of water at high pressure, the holes were connected by tunnels. Next three heavy slings were placed under the vessel. One was located just forward of the wheel house, another just forward of the engine, but aft of the break in the hull, and one under the propeller shaft at the stern. Then the forward and aft slings were connected to the lighter's derricks. The center sling was connected to a set of 7-sheave blocks rove with 15 parts of 1-inch steel wire cable. The lighter was counterweighted with the GENERAL'S boiler and 500 tons of rock deck ballast.

Hoisting was begun at 7:30 a. m. and an hour later the hull was clear of the bottom and within 12 feet of the surface of the lake. At this juncture, the tackles were block and block. Then the wreck was towed five miles below Mud lake to clear water. The muddy water had hindered the work materially as it made it almost impossible for the divers to see to work below the surface.

The hull was allowed to rest in 30 feet of water while the slings were shortened and the patch for the hull prepared. Then the hull was brought to the surface, the patch placed in position and the pumping operation begun.

Cradled in Mud

THOSE directly engaged in wrecking operations find much of the fascination of their work comes from the unusual conditions surrounding each job. Generally, each salvaging operation develops conditions peculiar to itself. The work described in this article is unusual because the vessel lay on her side, deeply sunk in the mud 55 feet below the surface. The plan for raising her was devised and carried out by T. L. Durocher, Sault Ste. Marie, Mich. Passing slings under the vessel was a difficult job as the mud interfered greatly with this operation. The work of raising the vessel was begun on the ice last winter and then discontinued until this spring. The craft will be repaired and again placed in commission.

HULL OF THE TUG GENERAL AFTER RAISING IS SHOWN AT THE LEFT—THE LIGHTER SAINTE MARIE IS SHOWN COUNTERBALANCED AGAINST THE LIFT WITH 500 TONS OF ROCK AND THE TUG'S BOILER—RAISING PURCHASE WAS THROUGH 7-SHEAVE BLOCKS—THE ILLUSTRATION AT THE RIGHT SHOWS THE GENERAL AFTER RAISING, PATCHING AND PUMPING OUT

THE HULL WELL AFLOAT WITH THE PUMPS FREEING IT OF WATER

It was also necessary to remove 60 tons of coal and about 3 feet of mud from the hold of the vessel. The wreck, after being pumped out, was towed to Detour, Mich.

The wrecking operations were carried out under the direct supervision of W. W. Durocher, while the underwater work was in charge of William McCoy.

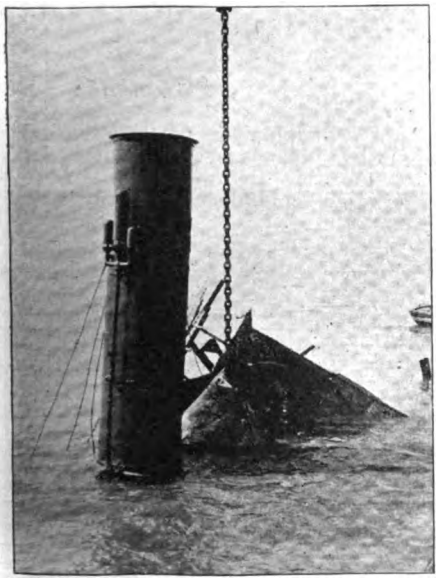
Resume Prewar Service

To take part in active service as mine layers and transports during the war and then to revert to peaceful passenger runs, for which service they were originally commissioned, is the romantic history of the steamers HARVARD and YALE. Built in 1906 at Chester, Pa., for express passenger service between Boston and New York on the Metropolitan Steamship Co.'s line, these two vessels have had eventful careers.

After several year's service, the HARVARD and YALE were transferred to the Pacific coast via the Straits of Magellan where they ran between San Francisco and Los Angeles. When the United States entered the war they were commandeered by the government and, due to their excessive speed, over 20 knots an hour, they were equipped as mine sweepers and detailed for overseas duty. Later they were used to transport troops. On her last voyage for the government, the YALE brought back 298 casual army officers of the American Expeditionary force.

These vessels were designed by Andrew Fletcher, the hulls were built at

DECK NEARLY AWASH JUST BEFORE PUTTING THE PATCH IN PLACE



BOILER, STACK AND HOUSE COMING OUT OF THE WATER

Roach's shipyard, Chester, Pa., while the machinery is a product of W. & A. Fletcher Co. The principal dimensions of the HARVARD are: Length overall, 376 feet; depth, 20.2 feet; beam, 61.3 feet; gross tonnage, 3737; net tonnage, 2317; speed, 20 knots an hour. The YALE is of the same dimensions with the exception that her gross tonnage is 3731 and her net tonnage 2312. Both vessels have triple screws driven by Parsons steam turbines.

The route these vessels originally followed on the voyage from New York to Boston is through Long Island sound and thence out on the ocean through Vinyard sound near the southern extremity of Cape Cod, then through Nantucket sound out on the Atlantic, around Cape Cod and on to Boston. The distance covered is 322 miles and the trip takes but 15 hours. This time has been cut down as the vessels now pass through the Cape Cod canal.

SWINGING THE GENERAL'S BOILER ABOARD THE SAINTE MARIE

Marine Draftsmen Meet

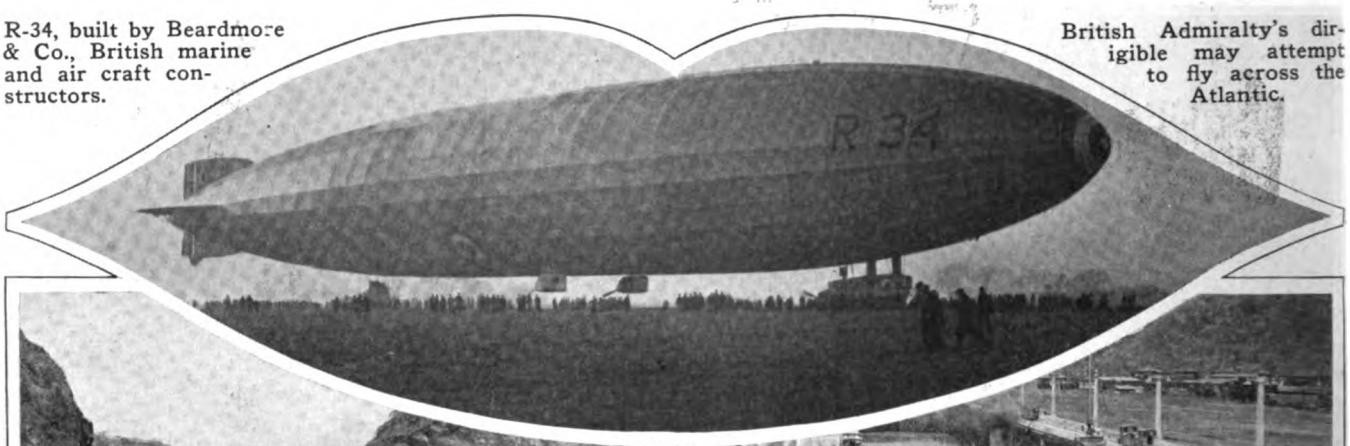
The eighth annual convention of the American Society of Marine Draftsmen will be held at the Hotel Brunswick, Boston, on June 20-21. The object of the society is to unite the marine draftsmen of the United States; to promote their general welfare professionally, intellectually and socially.

The officers of the society are: President, Alfred H. Haag; vice president, W. A. Leavitt Jr.; secretary, B. G. Barnes; treasurer, J. Binford Sadler; executive committee, George W. Nusbaum, E. H. Monroe and James A. Kelley.

A SLING WAS PASSED AROUND THE BOILER FOR RAISING IT

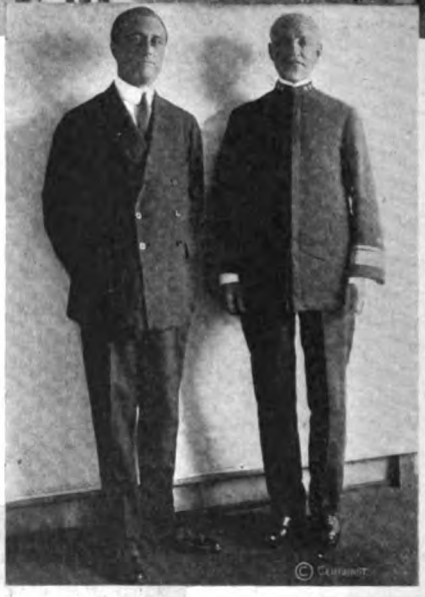
Latest Marine News Shown in Pictures

R-34, built by Beardmore & Co., British marine and air craft constructors.



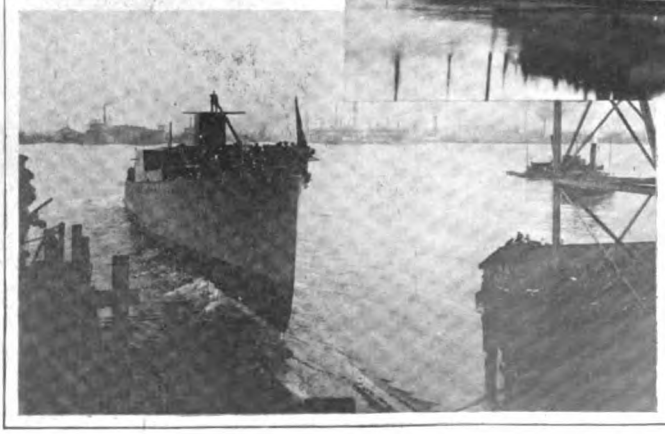
British Admiralty's dirigible may attempt to fly across the Atlantic.

The Saguache, built at Hog island, passing through the Panama canal enroute to the Pacific, and in the Gatun lock. At the right—Rear Admiral Sims confers on his return from England with Assistant Secretary of the Navy Franklin D. Roosevelt



Mrs. E. G. Miles, who sponsored United States torpedo boat destroyer Gilmer, built at Camden, N. J.

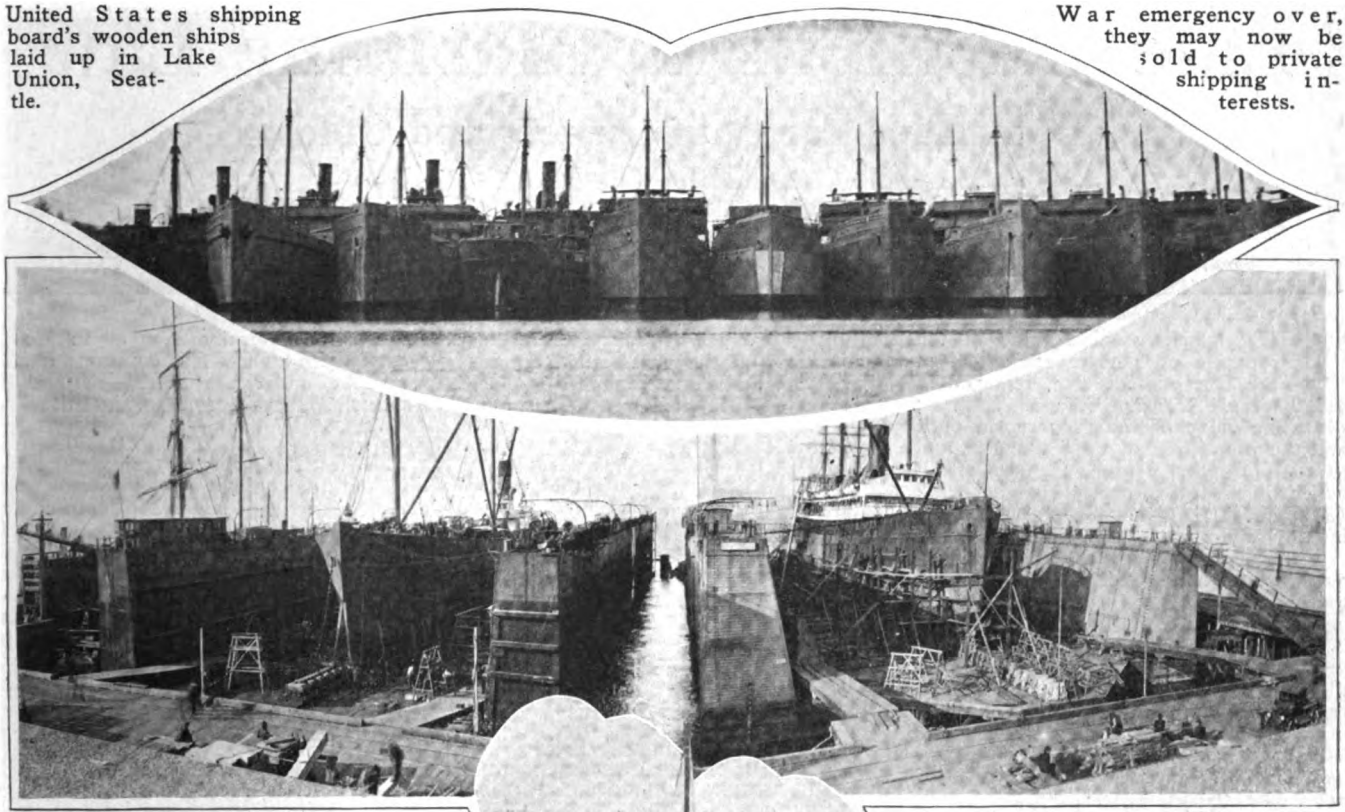
Brookdale, recently built by Meacham & Babcock, Seattle. Below—Cargo of rice unloaded at Seattle.



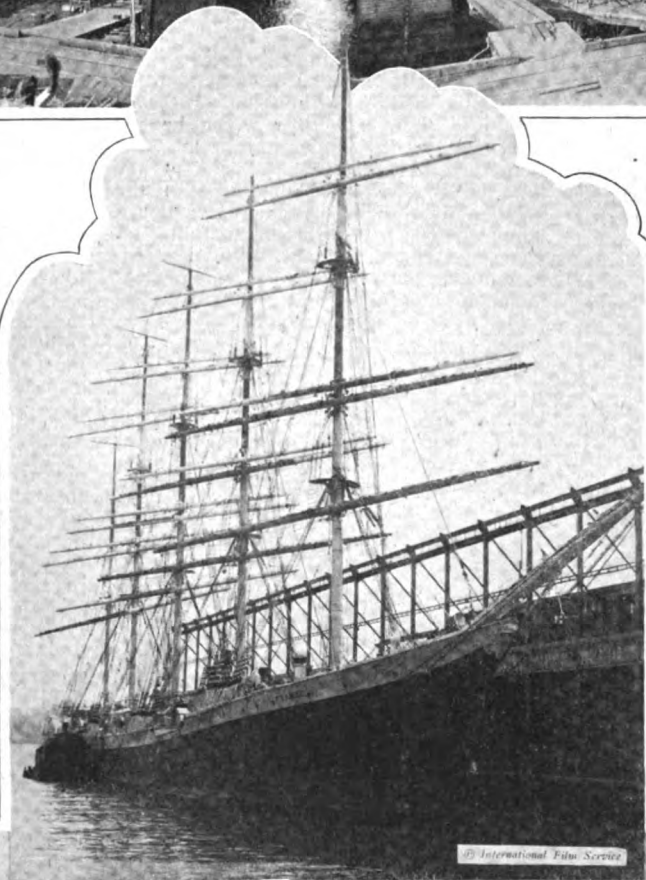
Photographs Gathered From Far and Near

United States shipping board's wooden ships laid up in Lake Union, Seattle.

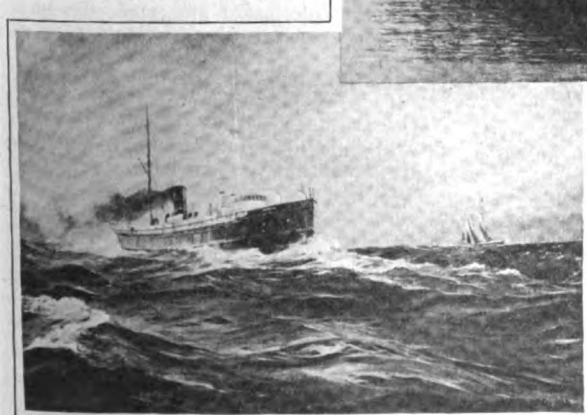
War emergency over, they may now be sold to private shipping interests.

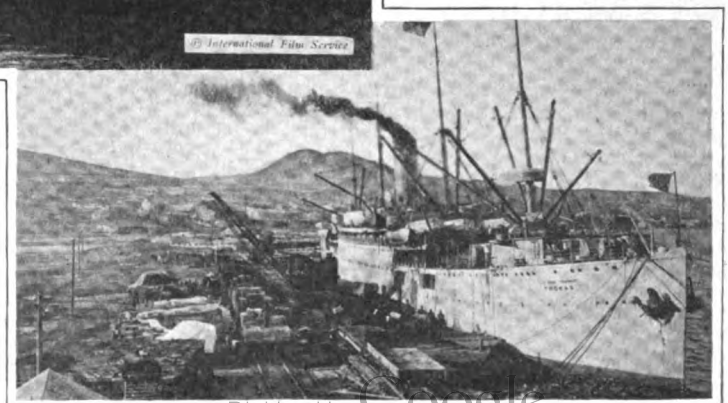


Here is the largest sailing ship in the world, the five-masted bark, France, of Bordeaux, which, painted a glistening white, successfully defied submarines in repeated trips to the United States during the war. Below is the Chemung, once owned by the Erie railroad and operated for many years on the Great Lakes. She was sunk by a submarine. The illustration is from a painting in possession of Richard P. Joy, Detroit banker.



"Big Bill," one of the largest drydocks ever put in commission on the Pacific coast, is owned by the Todd Drydock Co., Seattle. This dock has been the scene of much activity ever since its completion a few months ago, in handling rush repairs on ships. Below is the United States transport Thomas unloading a cargo of supplies at the base of the American expedition in Vladivostok, Siberia.





Late Decisions in Maritime Law

Legal Tips For Ship Owners and Officers

Specially Compiled for The Marine Review

By Harry Bowne Skillman

Attorney at Law

THE elements which enter in the estimate of salvage are stated in the case of KIA ORA, reported in 252 *Federal Reporter* 507, as follows: (1) The value of the property in peril and the proportion of the value lost and saved; (2) the degree of peril from which lives and property are rescued; (3) the value of the property employed by the salvor, and the risk of life and property incurred; (4) the skill and dispatch shown in rendering the service together with the foresight and skill exercised in the preparation to render it (5) the time consumed and the labor performed by the salvor. The court then said: "The consideration of all these elements should result in an award which will express reasonable actual compensation for the labor, risk, and skill of the salvor and the use of his vessel and appliances, and an added amount based on the degree of peril of property and life and the value of the property saved and lost sufficient to promote the highest degree of readiness and efficiency for the relief of vessels in distress." And further on the court remarked: "No formula can be derived which will meet the justice in every case. The per cent basis is no longer followed, because its application to the large values of modern times would lead to obvious injustice."

* * *

The pilot rules as to anchored vessels act of Aug. 19, 1890, chapter 802, section 1, article 11 (compiled statistics of 1916, section 7849), requiring an anchored vessel to carry forward a white light showing clearly around the horizon for a distance of at least a mile, is applicable to a boat lying at anchor and not expecting to move from her position, but does not apply to a boat drifting, with a small anchor dragging, but only for the purpose of retarding her progress and keeping her from going ashore while repairs are being made to the engine. "She is a stationary, but nevertheless navigating vessel, substantially out of control, and not an anchored vessel, so far as her signals were concerned."—O'BRIEN BROS., 252 *Federal Reporter* 185.

* * *

The right to enforce a lien arising out of a collision is given by the laws of the United States, it was said in the case of KONGSLI, reported in 252 *Federal Reporter* 267. "There appears, indeed," the court further said, "to be no reason in French law, under the principle of reciprocity, for dismissing the libel and leaving the question to the French courts, in a case which has not already proceeded to judgment. The maritime usages of foreign countries are not obligatory upon the courts of the United States, and will not be respected as authority, except so far as they are consonant with the well settled opinions of English and American jurisprudence. This is well settled by the Supreme Court."

* * *

Under section 4529 of the revised statutes of the United States, as amended by the seamen's act, which provides that the seamen shall be entitled to his wages in the case of vessels making foreign voyages within 24 hours after the cargo has been discharged, a seaman is not entitled to his wages in full up to the time the cargo is discharged at any port or ports at which the vessel calls and unloads her cargo but, according to the decision in the case of CUBADIST, reported in 252 *Federal Reporter* 658, the seamen is only entitled to his pay within 24 hours after termination of the voyage for which he has been employed. Under this same section the seaman shall be paid at the time he is discharged one-third of the balance then owing to him, and not a bonus equal to such an amount. A voyage is ended for any particular seaman when his period of employment under his contract ends.

* * *

The decisions in the cases of RESCUE, 116 *Federal Reporter* 380, and PACIFIC, 18 *Federal Reporter* 703, were followed in the case of Razukas vs. New York Trap Rock Co., 252 *Federal Reporter* 311, where it was held that in the absence of proof of any settled usage or custom of the port of New York, a captain employed on a scow at a certain rate of wages per month, without any specified term of service, may be discharged at any time, either during or at the end of a month, without previous notice, and can recover wages only for the time actually served. It was further held that discharge of such captain being lawful, reasonable force to overcome his physical resistance to being removed from the scow was also lawful.

* * *

"A person who enters upon the performance of duties as a seaman and who, through no fault of his own, has not as yet signed articles, would not be thereby deprived of the benefits accruing to his as a seaman. But, on the other hand, until the articles were signed and the vessel had left port, the libelant might have quit the vessel without loss of time or expense in returning home. For this reason he certainly cannot claim his wages for the voyage, nor for loss of time in getting back to his home port. * * * The rights of an American seaman in the harbor of New York upon a British vessel can properly be adjudicated in the courts of the United States according to the admiralty law, when this admiralty law is in exact accord with what his contract rights would be under the British statute."—VESTRIS, 252 *Federal Reporter* 201.

* * *

The "last clear chance" rule, in mitigation of the common-law principle that makes even the slightest contributory negligence a bar to recovery, it was held by the circuit court of appeals, seventh circuit, in the case of NORMAN B. REAM, reported in 252 *Federal Reporter* 409, is not applicable in this country in admiralty, where contributory negligence effects only a division of liability. However, the circuit court of appeals, fifth circuit, in the case of EL MONTE, reported in 252 *Federal Reporter* 59, seems to recognize the rule, the court saying, "If signals from the CLEMATIS gave notice to the EL MONTE of the presence of a vessel ahead when the latter was hidden from view by the fog, and thereafter the EL MONTE negligently failed to take suitable precautions to avoid a collision, and the CLEMATIS was not negligent after the imminence of a collision was disclosed to it, the EL MONTE is to be considered as solely responsible, because it had the last clear chance to prevent the collision, any antecedent negligence of the CLEMATIS in the matter of a lookout astern being remote, and such as could have made no difference in the result."

* * *

In the case of VAN DER D[illegible]YN, 251 *Federal Reporter* 746, it was held that an action will not lie against a ship for an error of diagnosis on the part of the officers with respect to an injury to one of the crew, but a vessel is liable for failure to take such steps as the situation evidently calls for, as the vessel owes it to a seaman to take reasonable precaution and to furnish reasonable aid, even to the extent of taking the man to the nearest place for remedy, and in default of this the vessel is liable for the consequences of failure to do so, even if the officers were honest in their opinion that the man was shamming. An error of judgment on the part of the officers means an honest error in choosing the method of treatment and it presupposes that they did the best that they could. But mere antiseptic dressing, without knowledge of what is proper treatment, is not sufficient for the assumption of qualification to diagnose; and should not be classed as an error of judgment. "The vessel should not be absolved from liability, if the ignorance of the officers is merely a basis for their utter failure to appreciate that they should do something to supplement their own lack of knowledge."

Devises Pontoon for Raising Ships

Double Pontoons Are Equipped With Chains for Fastening to the Gunwales and for Passing Under the Bottom of Submerged Craft

TO make the sea give up its hoard of treasure, both of sunken ships and of submerged cargoes, is a problem that has lured the inventive genius of engineers for centuries. Ever since Spanish galleons, freighted with gold and silver stolen by the buccaneers from the inhabitants of Central and South America, sank through inability to weather the fierce hurricanes that some times sweep across the semitropical waters between the two American continents, means to improve salvaging methods have been constantly sought.

Efforts to provide means to salve the immense treasure thus lost led many centuries ago to attempts to raise sunken vessels. One of the first attempts to locate sunken vessels was made in 1538 when two Greek investigators of an inventive turn of mind devised a crude diving bell in which they gave a practical demonstration before Emperor Charles V of Spain. Down through the intervening centuries, this dream of bygone days has been kept alive and millions of dollars have been sunk in fruitless schemes to make the sea part with this store of treasure.

The principal drawback against the majority of devices designed to raise sunken vessels is that they are originated by those who have had no experience in practical wrecking operations. While many of the plans offered look good on paper, they fail to function properly when put to actual use.

Device is Said to be Practical

Capt. Alex Cunning, wrecking master for the Great Lakes Towing Co., is the inventor of the pontoon for raising sunken vessels shown in the accompanying illustrations. The device is patented and many engineers who have examined the device pronounce it thoroughly practical. In the design of this pontoon, Captain Cunning has taken his ideas from the wealth of experience accumulated in the past 20 years during which time he has been engaged in actual wrecking operations.

With reference to the illustrations, Fig. 1 is a section of the pontoon showing the diver's way. Fig. 2 is an end view of two pontoons in position for raising a vessel. Fig. 3 is a plan view of the deck while Fig. 4 is a side elevation of one of the pontoons.

The pontoons are constructed of heavy material in order that they can withstand hard usage. Practically the same methods are used in building the pontoons as are followed in ordinary steel ship construction. The hull has a flat bottom, *1*, parallel sides, *2*, an arched upper deck, *3*, intermediate decks, *4* and *5*, and undercut ends, *6*.

The upper deck is equipped with several hatches, *7*, which communicate with compartments, *9*, between the decks, to permit of the pontoon being used as a lighter or for storage purposes at a dock. Along the sides of the hatchways are rails, *10*, which form a track for a traveling crane, *11*. This crane is operated by steam supplied by the boiler, *12*, which is located in the boiler and pump room, *13*, at one side of the pontoon. Coal bunkers are shown at *14*.

To Control Buoyancy

Compartments, *15* and *16*, between the lower deck and the vessel's bottom are for the purpose of increasing and decreasing the buoyancy of the pontoon. When the compartments are airtight, they also serve to keep the craft from sinking in case of collision. By admitting water through sea valves, the pontoon can be lowered to any desired waterline. Pumps are provided for emptying these compartments.

This feature is advantageous after pontoons have been attached to a sunken vessel as the relatively low position of the pontoon facilitates the divers' work. Again, water in these compartments serves as ballast to steady the craft while working in a heavy seaway.

One side of each pontoon is equipped with a number of angularly disposed chain or cable ways, *17* and *18*. These chainways are in the form of tubes the upper ends of which terminate in socket members, *19*, in the deck, *3*, and adjacent to the hoists, steam winches or chain winding devices, *20*. This apparatus is of the design usually employed for handling anchor chains in ordinary practice.

The lower ends of the chainways, *18*, terminate in sockets, *21*, in the bottom of the pontoon while the lower ends of the chainways, *17*, terminate in socket members, *22*, which are carried by the inner walls, *23*, of the diver ways, *24*. These diver ways extend from the deck to the bottom of the pontoon and are fitted with ladders or hand grips, *25*. It has been found necessary to have the chainways, *17* and *18*, extend through some compartments of the pontoon. This necessitates the chainways, *17*, being at a greater angle than those shown at *18*. The object of this is to have certain chains, *26*, extend to the bottom of the pontoon and under a sunken vessel, *27*. Other chains, *28*, extend from the confronting sides of a pair of pontoons and are attached to the sides or gunwales of the sunken vessel as shown in Fig. *2*.

To permit a pair of pontoons to be used safely in raising a sunken vessel, the sides of the pontoons having the diver and chainways are provided with a number of extending booms, *29*, which may be operated by power or manually. These booms can be used to connect the pontoons and are equipped with ball and socket joints, *30*. This arrangement allows the pontoons to float freely, parallel to each other, without danger of collision or separation.

The inventor states that when the chainways and chains are properly distributed along the length of the pontoons and the hoisting engines properly controlled similar to towing engines, it is possible to raise the sunken craft on an even keel. It is also pointed out that the initial movement of the sunken vessel may be materially facilitated by removing a portion or all of its cargo or by making use of the buoyancy of the pontoons before the hoisting engines are started.

Both pontoons are provided with fore and aft anchors, *31*, together with lowering and raising mechanism.

Crew Space Provided

As salvage operations usually consume some time, each pontoon is provided with quarters for officers and crew, machine shop and all other necessary apparatus to facilitate wrecking operations.

After the initial preparations for raising a vessel have been made, the compartments of the pontoons can be pumped out causing them to rise with the submerged vessel. Thus the initial raising operation can be carried out without the use of engines or other mechanism. Again, while working in salt water, the rise and fall of the tide will aid materially. At mean low water, the chains running from the pontoons to the wreck

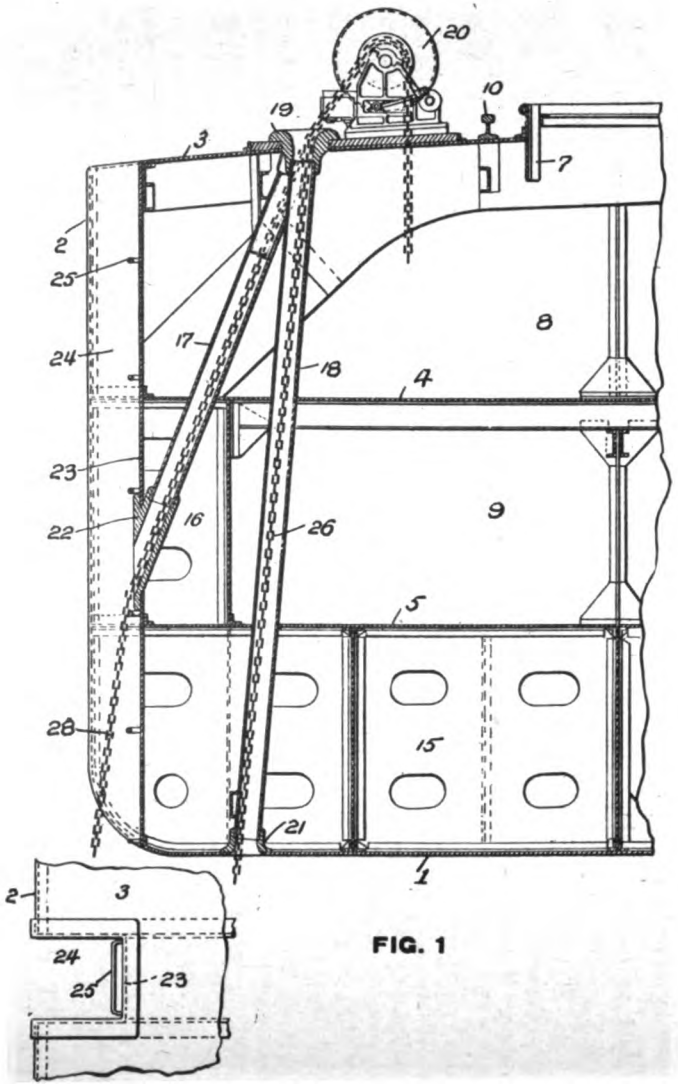


FIG. 1

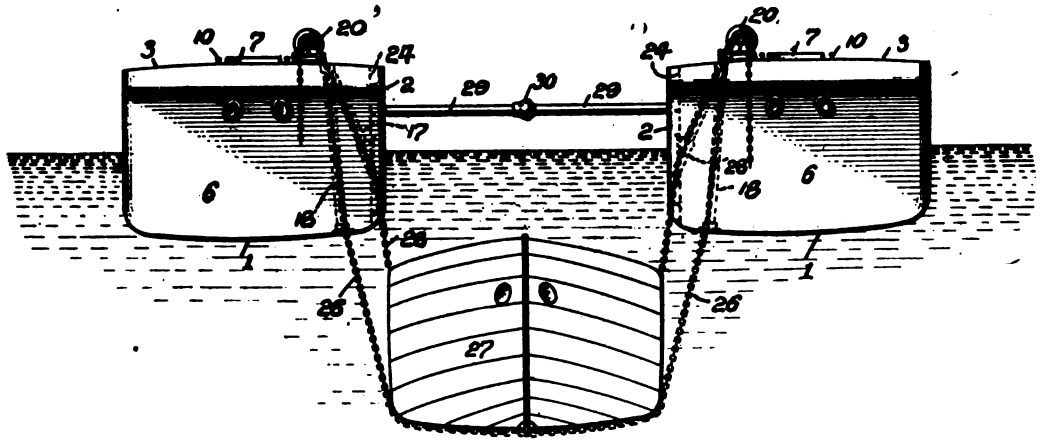


FIG. 2

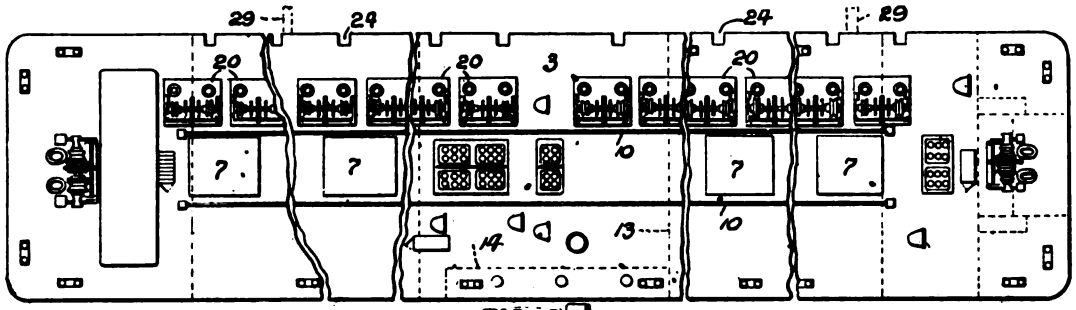


FIG. 3

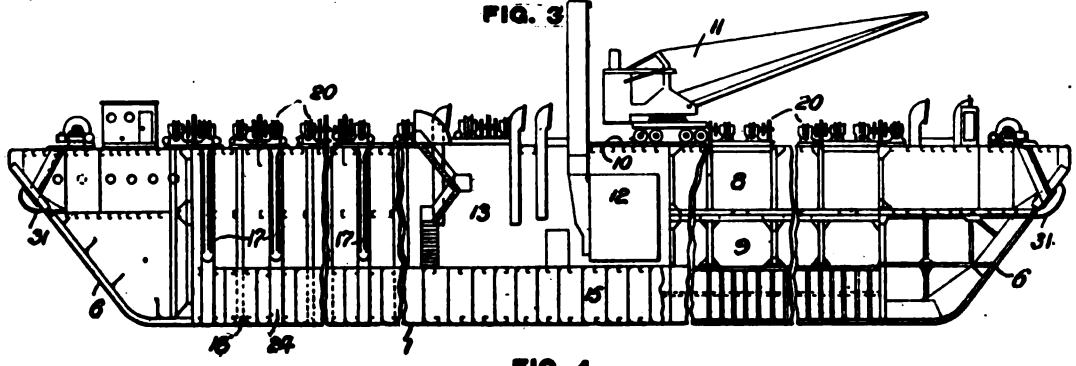


FIG. 4

PONTOON FOR RAISING SUNKEN VESSELS—FIG. 1 IS A MIDSHIP SECTIONAL VIEW, THE LOWER ENLARGED VIEW BEING A PLAN OF A DIVER'S WAY—FIG. 2 SHOWS HOW TWO PONTOONS WORKING TOGETHER APPEAR FROM ONE END WHILE RAISING A SUNKEN VESSEL—FIG. 3 IS A PLAN VIEW OF THE DECK WHILE FIG. 4 IS A SIDE ELEVATION OF ONE PONTOON

can be hauled taut and as the tide rises the pontoons, floating above the wreck will, of course rise also, bringing the wreck with them.

A factor that has caused considerable delay in times past in attempting to raise sunken vessels is the fact that the wreck often lists as it is raised from its bed on the bottom. Sometimes it turns turtle. With Captain Cunning's pontoons, this is held impossible as the wreck is securely cradled in the chains running upward

Captain Cunning points out that his plan is an adaptation of the floating drydock idea, only that instead of a shell bottom, such as drydocks have, the two sets of chains act as a cradle to support the submerged vessel.

Wrecking operations on the Great Lakes have generally been carried out with cofferdams which are built around the submerged vessel and then pumped out. This work is slow and costly and involves risk because a gale is liable to spring up which kicks up a nasty sea that often destroys the strongest cofferdams possible to construct. Again, the pressure on a cofferdam after it is freed of water is enormous, threatening collapse at any moment.

The depth from which a sunken vessel can be raised depends, of course, on the distance the divers can go under water to pass the chains under her. The greatest depth divers have descended to in salt water is 300 feet in the case of the F-4 which sank in Honolulu harbor, March 25, 1915. This, however, was an unusual emergency operation. The greatest practicable depth to which divers can safely descend is approximately 115 feet in salt water and 125 feet in fresh water. It is obvious that it is possible to remain submerged at a greater depth in fresh water due to the fact that its specific gravity is less than that of salt water.

Has Had Broad Experience

Capt. Alex Cunning, the inventor of the device described, has spent practically all of his life on the water. He was born in Scotland and came to this country with his parents when two years old. His father, Andrew Cunning, was a pioneer vesselman on the lakes and made his home in Bay City, Mich. As a boy, Captain Cunning the younger knew a vessel from stem to stern and was an able seaman before he was out of his 'teens. At the age of 20 he definitely decided to make the sea his career and has followed it ever since. For 10 years before entering the employ of the Great Lakes Towing Co., he was a diver for the old Escanaba Towing & Wrecking Co.

For nearly 20 years, Captain Cunning has been connected with the Great Lakes Towing Co., for the greater part of the time in complete charge of wrecking operations on the lakes. During that time he has successfully handled some of the most difficult wrecking jobs on the lakes. He enjoys a nation-wide reputation for success and daring.

He has to his credit over 120 successful wrecking operations. In one of his busiest years he handled 26 wrecks. One autumn, a few years ago, when the lakes were covered with a blanket of smoke from forest fires that made successful navigation almost impossible, he succeeded in releasing 11 stranded vessels in a single week.

Raising the Eastland

One successful feat that brought him world-wide fame was the releasing of the EASTLAND which turned on her side in the Chicago river in 1915 with a loss of hundreds of lives. Just 12 days from the time Captain Cunning left St. Ignace, Mich., with the old wrecker FAVORITE, now in foreign waters and replaced by a new craft of like name, he had successfully raised the EASTLAND and was back again at St. Ignace where the FAVORITE was stationed.

In 1909, Captain Cunning was summoned to right the Ann Arbor car ferry No. 4 which turned over on her side in Manistique harbor, Mich., with 24 steel freight cars aboard, loaded with 50 tons of ore each. After removing plates from the side of the vessel, Captain Cunning took out the cars and ore and then successfully raised the vessel, a feat which attracted much attention.

Another difficult wrecking feat successfully accomplished by Captain Cunning consisted of righting the steamer EDWIN L. FISHER, which turned over on her side in the Detroit river after being rammed by another vessel. The FISHER carried a full cargo of coal in her hold in addition to a deck load of 65-pound steel rails. These were securely lashed at each end and when the vessel turned over, the rails interlaced into a seemingly hopeless tangle. In spite of this fact, the steamer and her full cargo was saved.

Captain Cunning believes in sticking to a job until it is done. When the WESTERN STAR went down in Georgian bay, in 1914, her stern lay in 100 feet of water while her bow was clear. Twice Captain Cunning had everything ready to raise the craft when contrary winds kicked up a heavy sea and suspended operations. On the third attempt, however, he was rewarded with success.

At the present time, Captain Cunning informed a representative of THE MARINE REVIEW, there are a large number of vessels both in Great Lakes' waters and on the coasts of the northern Atlantic that can be successfully raised. He states emphatically that it is possible to raise the bulk freighter CHARLES S. PRICE which turned turtle in Lake Huron in the great storm of Nov. 9-11, 1913. This vessel has created much comment, due to the fact that while loaded to the coamings with coal, she not only capsized but turned turtle completely. She now lies bottom upward, a menace to navigation, on the bottom of Lake Huron.

Regarding the numerous cargo vessels sunk by the depredations of the German U-boats, Captain Cunning draws attention to the fact that many of them lie in comparatively shallow water, loaded in many instances with cargoes of a nonperishable nature. Thus their salvage would accomplish the double purpose of reclaiming valuable merchandise as well as restoring the craft to usefulness.

At the present day, ships sunk during the war and now lying on the ocean bed, total millions of deadweight tons. The majority of these vessels were sunk in foreign waters but many were sunk in waters adjacent to this country.

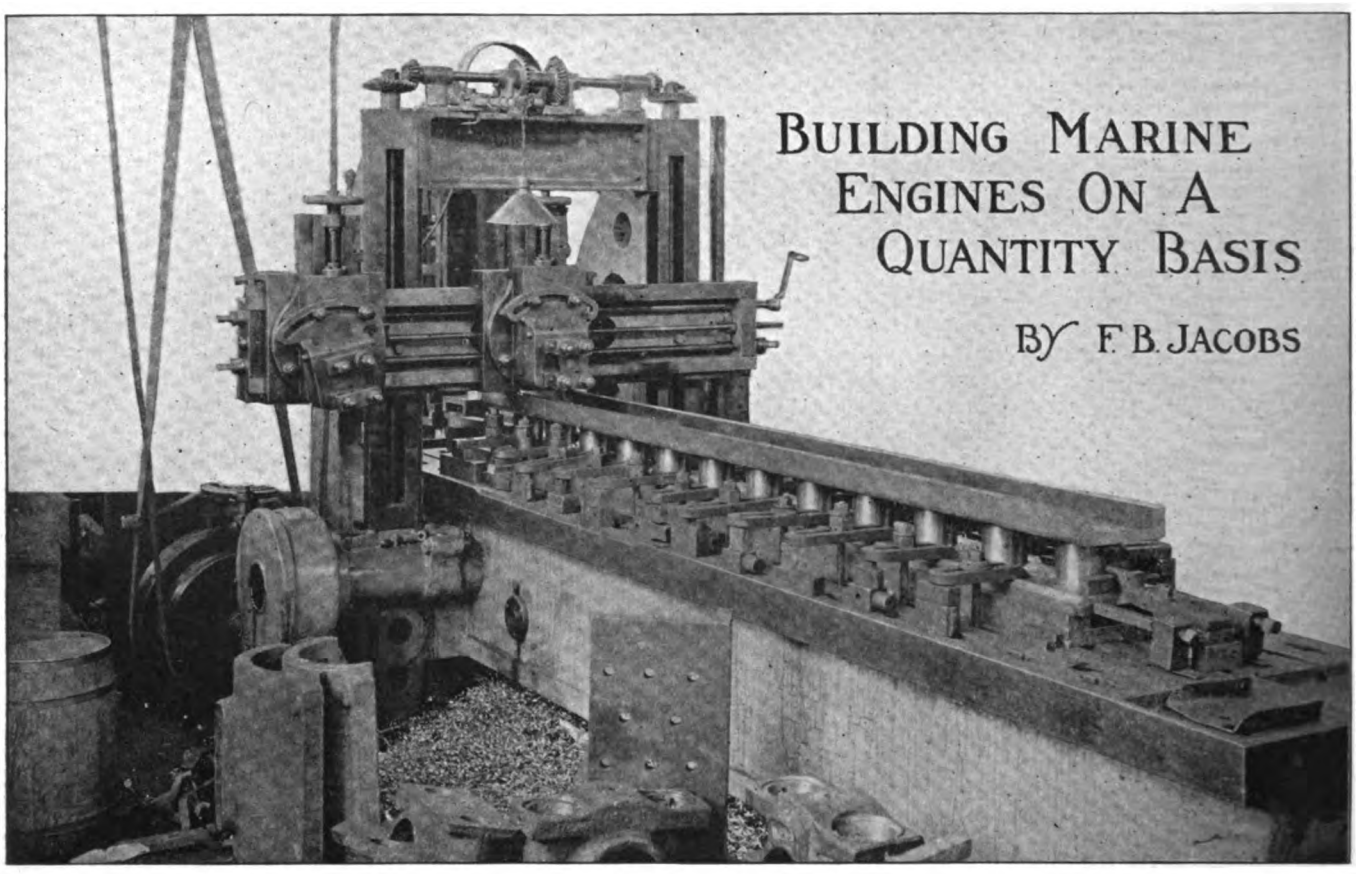
Captain Cunning points out that it should be a comparatively easy matter to raise the EMPRESS OF IRELAND which lies on the bottom of the St. Lawrence river near Father point. This vessel was rammed by a collier while outward bound.

Another vessel that the British are anxious to bring to the surface is a liner that was sunk in the Mediterranean, in the hold of which is an immense amount of gold, destined for London. From these facts it is readily seen that salvaging operations on a gigantic scale are in prospect and before long the recovery of vessels and cargoes that can be reached should be under way.

Late Marine Patents

Copies of any of the following patents can be obtained by sending 15 cents in stamps to Siggers & Siggers, National Union Insurance building, Washington, by mentioning THE MARINE REVIEW.

1302570—Floating ship form, John A. Lynch, Philadelphia.
1302951—Boat propelling means, Allen Nase, Joplin, Mo.
1302957—Marine propulsion mechanism, Richard B. Owen, Washington.
1303046—Seamless metallic boat construction, Joseph Dimes, Brooklyn, N. Y.
1303049—Leak stopper, John Endreson, Brooklyn, N. Y.
1303266—Submarine artillery, Kennedy Dougan, Minneapolis.
1303369—Reinforced concrete ship, George C. Newton and Ralph E. Newton, Milwaukee.
1303508—Multiple propeller boat, William M. Simpson, Portland, Oreg.
1303522—Torpedo guard or shield, Millard E. Theodore, New York.
1303550—Collapsible boat, Archibald E. Ford, London, England.



BUILDING MARINE ENGINES ON A QUANTITY BASIS

BY F. B. JACOBS

Fig. 14—Planing Twelve Link Blocks at One Operation—The Liberal Use of Jigs and Fixtures Enables This Plant to Turn Out Accurate Work at a Minimum Labor Cost—This Practice Also Insures Duplication of All Units of a Given Kind

ONE of the most important units of any marine engine is the thrust bearing, often spoken of as the thrust block or thrust. When one stops to consider that the force exerted on the water by the propeller in driving the vessel either forward or astern comes directly on the thrust bearing, it is readily appreciated that this member must be properly designed and carefully made. Otherwise it is sure to heat and cause trouble.

Thrust bearings are of two types called plain and horseshoe. This unit is sometimes located at the stern end of the shaft tunnel, in close juxtaposition to the stern tube, but latter-day practice favors placing it directly abaft the engine, in which case the thrust shaft is coupled directly to the engine crankshaft.

With the type of engine built by the Hooven, Owens,, Rentschler Co., Hamilton, O., the thrust bearing is of the horseshoe type installed directly abaft the engine. This unit is illustrated in Fig. 15. In comparing the two types of thrust bearings, plain and horseshoe, many naval architects and marine engineers favor the latter type, due to the fact that each thrust ring is a separate unit capable of independent adjustment or removal. Thus, if one ring runs hot it is a comparatively simple matter to adjust it or remove it entirely if necessity requires this step. This is easily done.

The thrust bearing illustrated in Fig. 15 has a cast iron box-type base designed to hold a supply of oil which is cooled by copper coils through which sea water circulates. The thrust rings are cast iron, lined with bearing metal on both sides. The rings are cored for water circulation while each one is adjusted through the medium of nuts threaded over steel side rods.

The bearings for these side rods are fitted with cast-iron caps to permit easy removal. To prevent oil from being thrown out, the thrust bearing is provided with sheet-metal guards. The end bearings for the

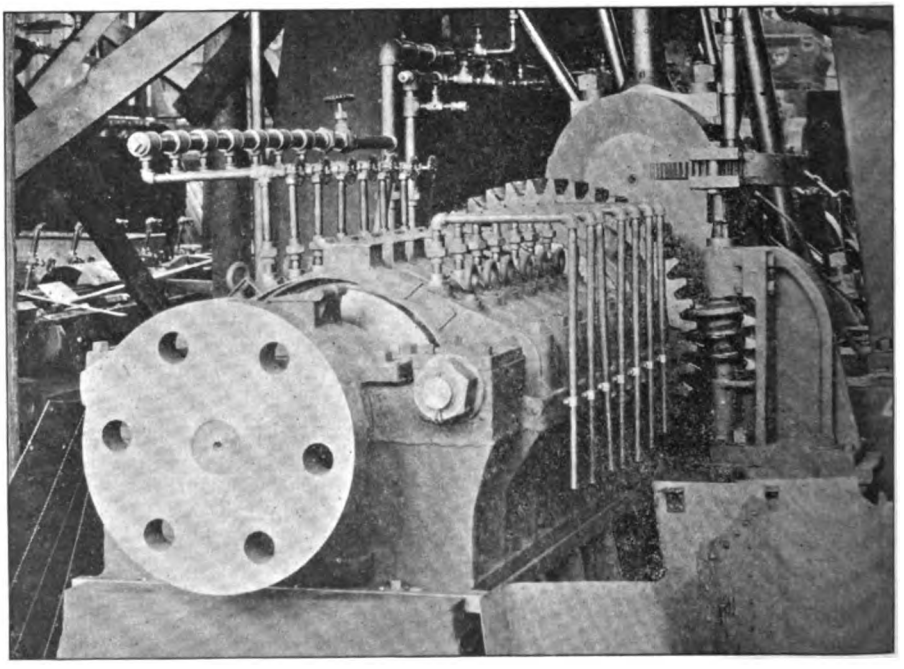


FIG. 15—HORSESHOE TYPE WATER-COOLED THRUST BLOCK USED ON ENGINES FOR THE EMERGENCY FLEET CORPORATION

thrust shaft are cast iron, lined with bearing metal. They are equipped with a composition half-gland for holding oil.

The first step in machining the base for the thrust bearing consists of finishing the flat surfaces on the bottom. It is essential that this surface be planed perfectly true, otherwise the casting will be distorted when it is bolted to its foundation. This error could, of course, be corrected in the assembling operation by means of shims but the experience of the Hooven, Owens, Rentschler Co. has proved that the rapid and satisfactory assembly of various units depends largely on the accuracy of the previous machining operations.

Speeds Up Production

THAT it is economical to machine many parts at one operation whenever possible while building heavy machinery, such as marine engines, is graphically shown by several illustrations in this article, which is the second of a series describing manufacturing operations on marine engines at the plant of the Hooven, Owens, Rentschler Co., Hamilton, O.

The previous installment, which appeared in the June issue, described manufacturing operations on heavy units such as bed plates, columns, cylinders, crankshafts, connecting rods, etc. The present installment describes manufacturing operations on many of the lighter units such as the valve gear, bearings, air pump, crosshead, etc.

The concluding article, which will be published in August, will describe assembling operations. These articles, secured exclusively for THE MARINE REVIEW, *give a little insight into the tremendous work American manufacturers faced in promoting the winning of the war by adapting existing plants to war production on a quantity basis.*

After the base is planed the seats for the end journals and the flat surface for locating the thrust rings are carefully finished by planing. Then the end bosses for the side rods are faced. Holes for the foundation bolts are next drilled. This work is done on a radial drill and the holes are located by means of a jig to insure accurate duplication. The holes for the side rods are also drilled and reamed in a jig which locates from the end bearing seats.

In machining the thrust rings, the first step is to rough out both side surfaces. This operation is generally done on a vertical boring mill. Next the wearing surfaces are formed by casting bearing metal in place. This metal, after cooling, is thoroughly hammered, or peened. The object of this is twofold: It densifies the metal and seats it securely in place. In the design of the thrust rings seats are provided for anchoring the bearing metal in place. Next the bearing surfaces are finished by turning on the boring mill. In this operation it is essential that both sides be parallel to insure a good bearing after the unit is set in place in the assembly operation. The bottom of the bearing is now planed square with the bearing surfaces, after which holes for the locating studs are drilled by means of a jig. Drilling and tapping the holes for the water circulating pipes completes the machine work.

The thrust shaft is machined from a solid steel forging. The first step is to center the piece accurately, after which it is mounted in the lathe and roughed out all over. It is carefully recentered before the finishing operation, due to the fact that the sides of the collars and the main journals must stand square with each other. As the piece is located from the centers on this operation, it is apparent that they must be true. The heavy roughing cuts distort the centers somewhat which makes recentering before the finishing operation necessary to insure accurate results. The journals and the sides of the collars receive an additional finish by polishing with emery and oil. This insures smooth running surfaces. The

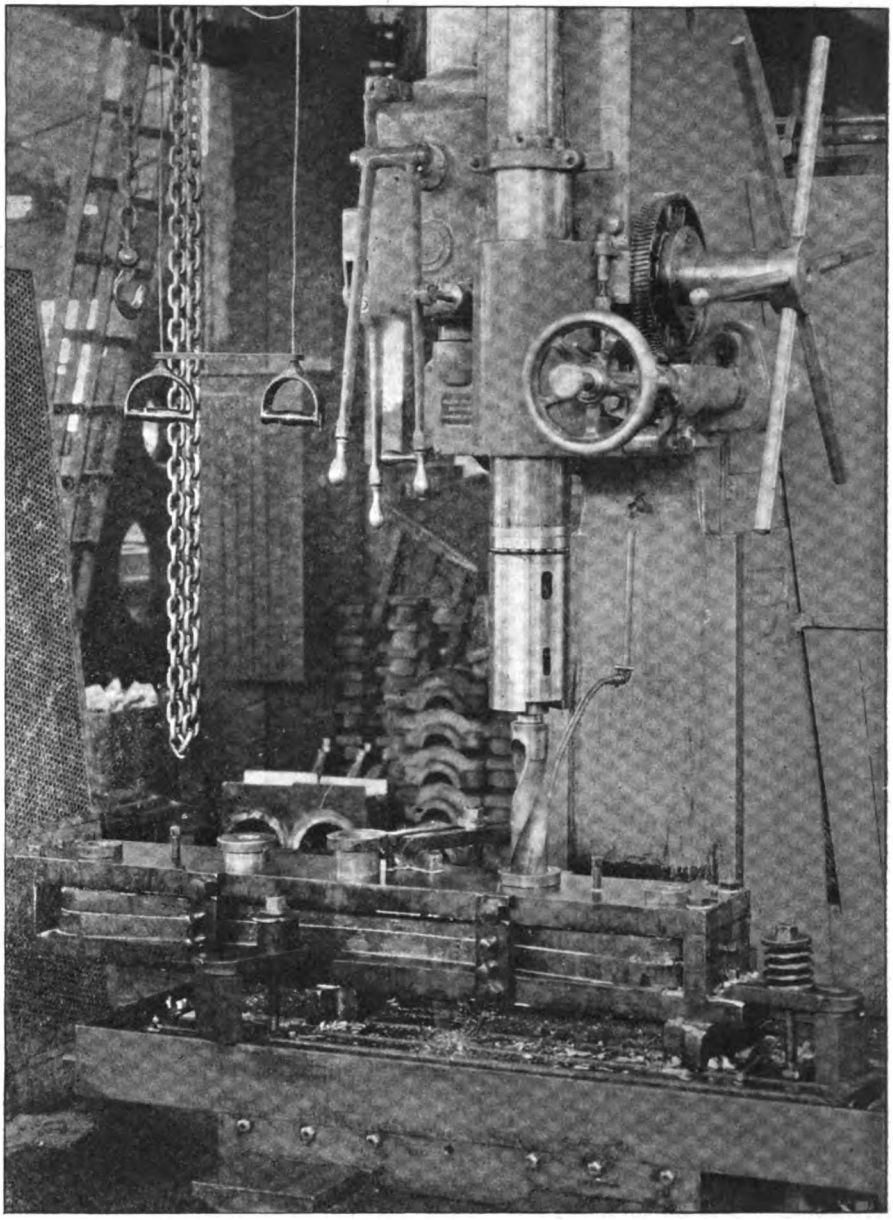


FIG. 16—HOW THE HOLES FOR PINS ARE DRILLED IN LINK BARS—A JIG IS USED FOR LOCATING THE HOLES AND TWO BARS ARE DRILLED AND REAMED SIMULTANEOUSLY

holes for the coupling bolts are now drilled and reamed by means of a jig. The coupling bolts are steel, finished all over and furnished with nuts and split pins.

The air pump is of the Edwards type, driven from the low-pressure crosshead through the medium of a walking beam. The pump casing is cast iron, lined with composition metal and is attached to facings on the engine bed plate. The pump rod, or piston rod, is steel covered with brass. The buckets are cast iron with composition followers.

The pump casing is bored on a vertical boring mill, after which the necessary flat surfaces are finished on the planer. The holes for locating it in place and those for the cover are drilled by jigs on the radial drill. The pump rod is turned in the lathe, cased with brass and then carefully finished. It is obvious that it must be both round and parallel to insure the pump functioning without leakage. The pump piston is cast iron. This unit is machined on the vertical boring mill by methods familiar to every mechanic.

The air-pump crosshead is a steel forging, finished all over. This member drives the bilge pumps also, these being located at the sides of the air pump. The crosshead is first centered and the round portions finished in the lathe. Flat portions are next finished on the planer after which the holes for the air pump and bilge pump pistons, or plungers, are machined. This work is done on a horizontal boring mill. The holes are first roughed, drilled and then bored to size with boring bars. Care is exercised to make sure that the holes are correctly spaced the required distance apart, otherwise the unit would not align properly in the assembling operation.

Machines 40 Pieces Simultaneously

In ordinary marine-shop practice, it is customary to machine parts one at a time, due to the fact that manufacturing operations for a given period are confined to but one engine. In building marine engines in lots, however, the work is expedited materially through machining a large number of parts at one operation. This saves a large amount of time, due to the fact that it takes approximately as long to set up a machine tool for a given small operation as it does to machine the work after it is set up.

An excellent illustration of how time is saved at the Hamilton plant in machining units in quantities is shown in Fig. 20. The parts shown are air-pump shaft boxes. This operation, which is the first machining operation, consists of milling the flat surfaces. The work is done on a large horizontal milling machine. Forty box halves are strapped to the platen at one setting. A large inserted-tooth cutter is utilized for milling. After the pieces are milled, they are held together in pairs and bored to receive the shaft. This work is generally done on the vertical boring mill as this tool, owing to the fact that its platen, or face plate, is horizontal, readily lends itself to operations of this kind. Under ordinary working conditions, a pair of these boxes will last for many years without attention, provided, of course, they are properly lubricated. When wear develops, it is a simple matter to file away a slight amount from the flat surfaces that are in contact when the boxes are assembled, and scrape the box to a good fit again.

The walking beam that drives the air and bilge pumps is a double unit made of steel plate. The first operation in machining these parts is roughly to cut them into the desired shape, after which they are surfaced on the planer. Several are held on the platen at one setting by means of pinch dogs and clamping posts.

For further finishing operations, several plates are fastened together for machining. The outside is finished on the planer and shaper after which the holes are drilled and bored. Fig. 18 shows eight plates fastened together in position under a radial drill. Here the hole is finished in one end and an arbor inserted for holding the plates in correct location during subsequent operations. This arbor furnishes a simple means to the desired result. After the holes are machined, the plates are taken apart and finished smooth by drawfiling. As previously indicated, the walking beam consists of two plates, which are spaced the required distance apart to accommodate the link that drives the unit from the crosshead. Thus, while the distance between the holes need not be held

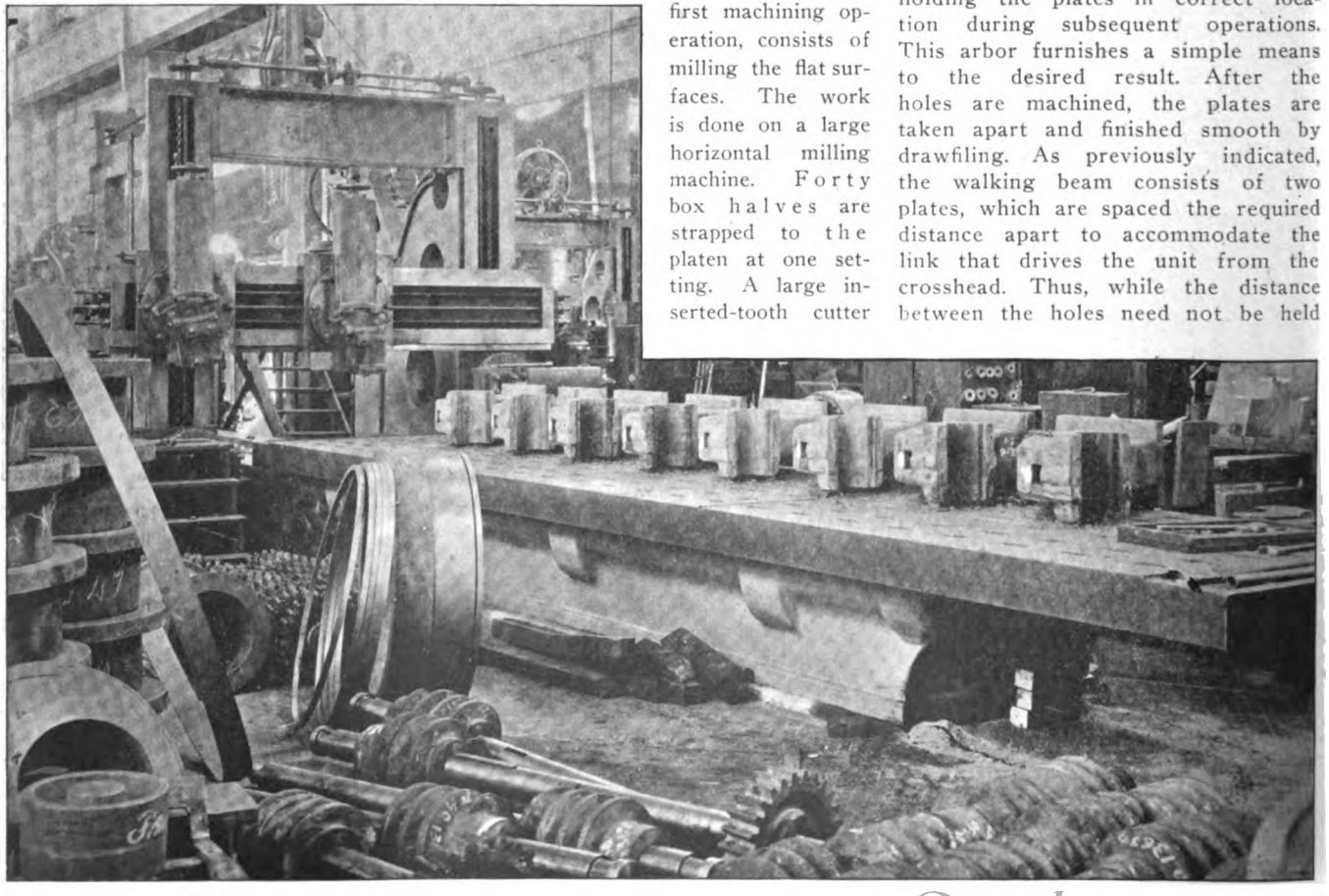


FIG. 17—SEVERAL REVERSE-SHAFT BRACKETS LOCATED ON THE PLANER FOR MACHINING AT ONE OPERATION

within extremely close limits, scale measurement being near enough, it is obvious that the two units which are machined at one setting must be incorporated into the finished part. Thus, the number of pieces fastened together in the machining operation must be a multiple of two. In Fig. 18, eight parts are fastened together for machining at one setting.

The valves on this engine are actuated through the medium of a stephenson link motion with open rods. The link used is of the double-bar type. The valve gear is equipped with linking-up screws for the purpose of altering the cutoff of any cylinder independent of the others. Pins for the eccentric rods are riveted to the link bars while the suspension pin is a continuation of the go-ahead eccentric rod pin. The link bars are held the required distance apart by cast iron spacers.

The link bars are steel forgings. The first operation in the machine shop consists of surfacing them. This work is done on a planer of unusual type which has two housings, cross-rails, etc., facing each other. This tool is illustrated in Fig. 19. It is an economical tool as it cuts on both strokes of the platen. The link bars are held, several in a line, on the platen by pinch dogs and clamping posts. The pieces are first roughed out, leaving several thousandths of an inch on each surface for finishing. Finishing is done with a steel finishing tool.

The next operation consists in machining the holes for the eccentric rod pins, and the fillers that hold the link bars the required distance apart. These holes are drilled and reamed in a jig on a heavy-duty drilling machine as illustrated in Fig. 16. The link bars are drilled and reamed two at one setting. This operation is simple and is readily understood from the illustration.

After the link bars are drilled and reamed, the next operation consists of forming the radii over which the link block travels as the gear is hooked up. Many schemes have been devised in times past for finishing these radii but the plan followed at the Hamilton works is simple and it is productive of accurate results. Those who understand marine engines appreciate the fact that the radii in question must be machined correctly to insure the valve functioning properly. These surfaces are finished on a large boring mill and are located by means of a fixture, strapped to the platen of the machine. The fixture is equipped with locating pins which engage the holes previously reamed in the links. Forty links are placed on the fixture and turned at one operation.

Assures Accurate Results

If the operator exercises care in setting the tools for the finishing cuts, accurate results are assured. Not only will the radii be of the correct dimensions but the turned surfaces will stand square with the sides of the link bars. This is essential as the better bearing the link bars present to the link-block gibs, the longer the unit will run without attention.

Another important member of the valve gear is the link block. This unit is located directly under the valve stem and is interposed between the link bars. It is machined from forged steel and finished all over. The first machining operation on this unit consists of turning and facing the center portion that fits the box at the end of the valve stem. In this operation, care is exercised to see that the center portion is turned round and straight and that the sides are faced true and square. At this setting, before the piece is taken out of the lathe, one outside face is finished. As this facing is done at the same setting in which the center portion was turned, it is obvious that it will be true and square with the turned part. This is essential, since the outer face as finished in the lathe is used as a locating point in subsequent operations.

The next operation is done on the planer and consists of finishing the flat surfaces. Several pieces are located at one setting in a shoe as illustrated in Fig. 14. Using the flat surface that was turned as the locating point in the first operation, it is an easy matter to machine all the flat surfaces square and parallel with the turned portion. This is easily done.

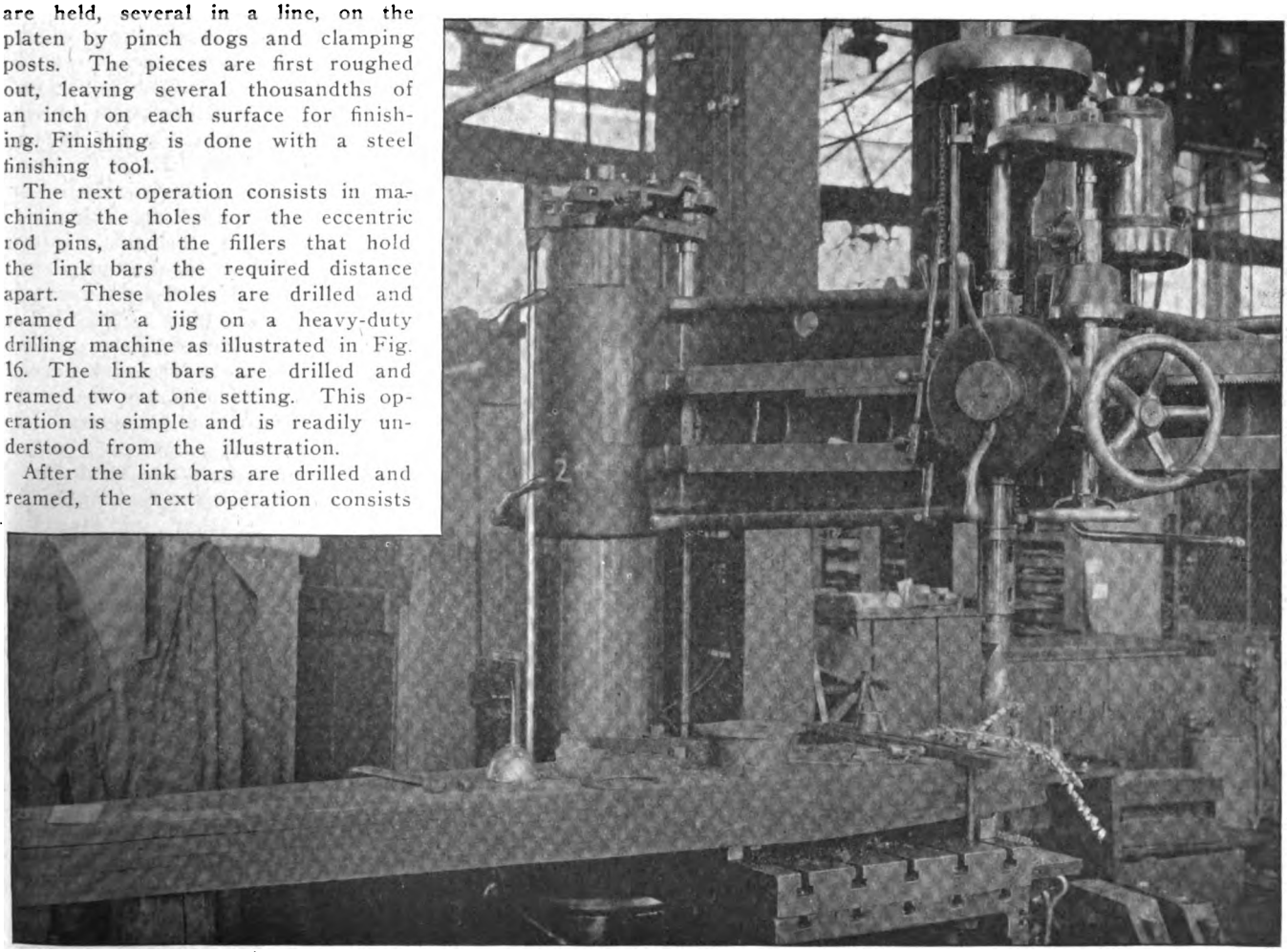


FIG. 18—EIGHT WALKING BEAMS FOR AIR PUMPS FASTENED TOGETHER FOR DRILLING AND REAMING

After all the planing operations are completed, the link blocks are fitted with composition gibs that bear on the link bars. These gibs are accurately machined to fit the curvature of the links and are provided with oil holes to insure proper lubrication at all times.

Eccentrics Present Many Problems

The eccentrics of any marine engine present serious problems, due to the fact that the space which can be allotted to them is generally limited. As a triple-expansion engine carries six eccentrics, it is necessary to make four of them in sections due to the fact that a split design is required to permit their being installed on the crankshaft. Two eccentrics can generally be made solid as it is a simple matter to slip them over the free end of the shaft.

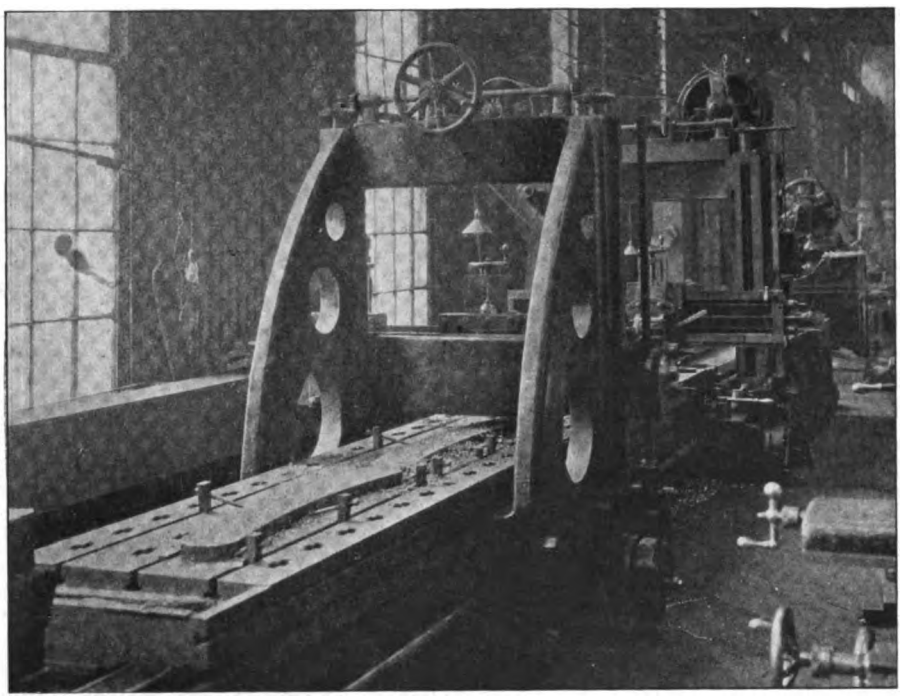


FIG. 19—UNIQUE TYPE OF PLANER EQUIPPED WITH TWO HOUSINGS—THE PIECES SHOWN ON THE PLATEN ARE LINK BARS

For two reasons, none of the eccentrics for the engine under discussion are installed over couplings. First, a comparatively large eccentric is necessary in this case which gives a large bearing surface on the strap. This causes unnecessary friction and consequent heat. Again, when eccentrics are installed over couplings, it is impossible to disconnect one section of the shaft to eliminate a cylinder in case of a breakdown at sea.

The eccentrics for the Hooven, Owens, Rentschler engines are cast iron. The low-pressure and intermediate eccentrics are made in two parts, fastened together with steel bolts, while the high-pressure eccentrics are made solid. All eccentrics are fitted with set screws to facilitate getting the correct leads in assembly and are firmly located on the crankshaft through the medium of keys embedded in the crankshaft.

In machining a solid eccentric, the casting is located in the chuck on a vertical boring mill where the hole for the crankshaft and one side is turned at one setting. For turning the other side and the periphery, the eccentric is located by its hole on a fixture that is placed offset on the boring mill table the required distance to give the stroke desired in the finished eccentric

Due care is exercised to make sure that the stud locating the eccentric stands square with the boring mill table. This is quite essential for if it should deviate even a slight degree the periphery of the finished eccentric would not stand parallel with the bore. This would result in what a machinist, or a marine engineer, terms a "wobbly" eccentric. Such a unit always causes trouble and is the direct cause of many cases of undue heating which sometimes results in carrying away or otherwise disabling the entire valve gear.

Castings for the split eccentrics are first accurately planed to form the joint. Next the holes for the bolts that fasten the two halves together are drilled, tapped and counterbored. The units thus formed are machined by precisely the same methods followed in turning and boring solid eccentrics.

After eccentrics of both types, that is solid and split, are bored and turned, they are drilled and tapped for the set screws that fasten them to the crankshaft. They are further secured through the medium of keys let into the crankshaft. The eccentrics are not keyseated, however, until the engine is assembled because they must be set to give the proper lead to the valves before the keyseat can be located.

The eccentric straps are made in two parts each. They are steel castings lined with bearing metal. The first machining operation consists of planing the flat surfaces that form the joint between the halves. Next, the sections are drilled and reamed to accommodate the bolts that fasten them together. A jig is used for this purpose which insures exact duplication of parts. After the sections are fastened together, the bearing metal is poured in place. When it has cooled, it is thoroughly peened in place and the strap is ready for boring and turning. This work is done on the vertical boring mill. The hole is bored and one side faced at one setting after which the eccentric is turned over and the other side faced.

Planing Must be Accurate

The next operation consists of planing the flat portion on which the T-end of the eccentric rod is fastened. This work is generally done on a shaper, care being taken to see that the planed surface stands square with the sides and parallel with the bore. This results in a workmanlike job and eliminates unnecessary shimming in the assembling operation. After this surface is finished, the upper section of the strap is drilled and reamed for the accommodation of the bolts that locate the eccentric rod in place. These are drilled and reamed generally on the radial drill, and to insure duplication of parts a jig is used for locating the holes.

The eccentric rods are steel forgings, finished all over but not polished. These rods are of the fork type with T-ends to fasten to the eccentric straps. The upper ends, which span the links, are fitted with combination bushings which are accurately bored to fit the link pins. These bushings have provision for taking up wear as it develops and are held in place through the medium of steel bolts with collar nuts locked in place.

The forgings for the eccentric rods are first carefully centered and turned in the lathe. At this setting, the flat portion at the bottom of the T-end is also machined. Next, the fork end is finished on the shaper. The holes for the link-pin bushings are bored

on a horizontal boring mill. This is an important operation due to the fact that this hole must stand parallel with the bottom surface of the T-end. Otherwise, it is necessary to spring the rod in the assembling operation to make it align properly, which procedure is generally unsatisfactory.

Whenever possible, many parts are machined at one setting. A good example of this is shown in Fig. 17. In this instance the parts are reverse-shaft brackets. Under ordinary conditions, these pieces would be machined one at a time, a procedure which involves considerable time in setting up operations. By locating several at one time on the planer, unnecessary work is avoided.

At one setting these pieces are planed on the surface that locates them on the engine columns, and at one side. Then they are turned over and the other side finished. The bearing for the caps is next planed. After the caps are in place, the brackets are bored to receive the reverse shaft. This work is done on the vertical boring mill.

The valve stems are steel forgings. They are first carefully turned to size in the lathe. Next, the lower ends are finished on the shaper. This end carries a split bushing which fits over the turned part of the link block. The bushing is held in place through the medium of a cap.

Accurate Lathe Work Involved

The piston rods also are steel forgings, so designed that the high pressure, low pressure and intermediate rods are interchangeable. As piston rods are comparatively bulky spare parts to carry aboard ship, this feature of interchangeability saves space. The rods are turned to size in the lathe. The first operation consists of taking a roughing cut over the entire rod, after which the tapered portions that engage the crosshead and piston are turned. Next, the threads at each end are cut. This operation is followed by finish turning both tapered portions. An accurate ring gage is used to insure turning the correct taper in this operation. The last machining operation consists of taking the finishing cut over the body of the piston. This is an important step because the rod must be round and parallel. Otherwise, steam would blow past the packing. The work is sized with micrometers and then carefully polished.

The crosshead guides are cast iron, bolted to the engine columns. These are provisioned for water cooling. They are carefully finished by planing by ordinary methods. It is necessary that this work be carefully carried out because the finished guides must be both flat and smooth to form an adequate bearing for the crosshead slippers.

The crank and wrist pin boxes are steel castings lined with bearing metal. These pieces are first planed accurately on the flat surfaces after which they are lined with bearing metal. The holes are next bored in the vertical boring mill.

The main bearings for the crankshaft are cast iron. These are carefully planed to fit recesses in the bed plate after which the bearing metal is cast in place. The holes are then bored in the vertical boring mill.

The crosshead is a steel forging. It is first planed to accommodate the slippers and then bored to fit the wrist pin. The taper hole, for locating the piston in place, is bored next. It is essential that the two bored holes stand exactly square with each other to insure proper functioning after assembly. Gages are used in sizing the holes to insure duplication of parts.

The crosshead slippers are cast iron lined with bearing metal. These are first planed to size after which the metal is cast in place. This is then carefully machined to insure a good bearing on the crosshead guide. The slippers are bolted to the crosshead, provision being made for adjustment for wear.

All the valves are cast iron. The high-pressure and intermediate valves are of the piston type while the low pressure valve is of the double-ported, plain slide valve type. The piston valves are first bored to fit the valve stems and then accurately turned to size. Next the grooves for the rings are cut.

The packing rings that fit these grooves are turned and bored, several at a time, in the vertical boring mill by the same methods previously described in machining piston rings.

The low-pressure valve is planed on its wearing surface and then machined to fit its stem. Next, the recess at the back for the accommodation of the balance ring is machined. This ring bears on a cast-iron balance plate, the object of this feature being to semibalance the valve. The balancing mechanism calls for accurate machining for if this is not properly carried out, leakage results which renders the semibalancing feature of little value. This throws an enormous load on the valve gear due to the large area of the valve in contact with its seat.

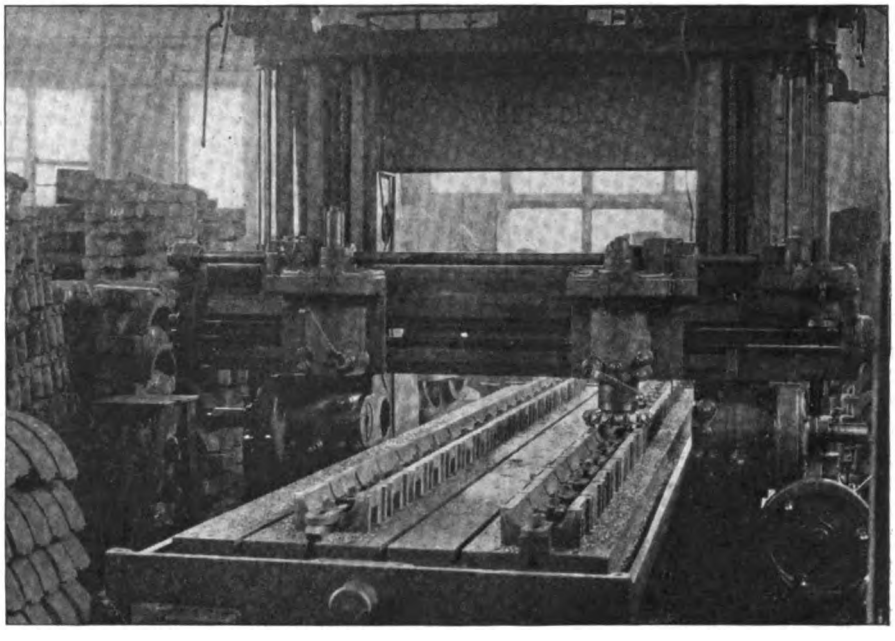


FIG. 20—MILLING 40 AIR PUMP BEARINGS AT ONE SETTING ON A LARGE HORIZONTAL MILLING MACHINE

In addition to the above major machining operations, there are a number of minor features. All machining operations are carried out with care to make sure that the finished parts will fit properly in assembly. Jigs and fixtures are used whenever possible.

Government specifications state that all materials and workmanship are to be the best for the purposes intended and that all wearing parts must be accurately machined. All flanges conform to the American Society of Mechanical Engineers' standard.

(To be concluded)

The New York & Porto Rico Steamship Co. has disposed of its interest in the steamer BERWIND to the government for $475,000.

Problems of the Vessel Operator

Far East Port Conditions—Insurance Rates—Fishing Men to Build Ships — British Ship Market Situation — To Nationalize Port

SHIPPING facilities at Shanghai and Hongkong are subjects of two preliminary reports just made to the department of commerce by Paul Page Whitham, trade commissioner. These reports will subsequently be used in a complete report on the ports of China upon which the department's agents are now working. They have been sent to the office of the bureau in the custom house, New York, for the convenience of shipping people generally.

The lack of American shipping at the Chinese ports is commented on. The greatest of the American godowns at Shanghai was sold to the Nippon Yusen Kaisha about two years ago, and today there is no American terminal in the port. Mr. Witham stated that at present one American company is building a moderate sized wharf and godown system for the use of its own and associated interests.

Shanghai has a population of about 1,000,000 and is in the center of a great industrial and commercial district. It is a financial center, possessing shipbuilding and repair yards with facilities for taking care of ocean going vessels up to intermediate size. The yards and drydocks are owned by either British or Chinese interests. Mr. Whitham declares that it is advisable for American ship lines to acquire their own terminal property and to act quickly as desirable waterfront is being rapidly disposed of at the present time.

Labor at the port is so cheap that there has been no incentive toward mechanical improvements in the handling of cargo. Nevertheless it costs about $1, gold, per ton to enter and clear a vessel, which is probably higher than the charges at other Oriental ports. A supplemental report discusses the port development project, and advises Americans to take an active interest in the future of the city. It will be necessary to deepen the channel approaches and construct new piers and docks. A general port administration will undoubtedly be established, through which will be co-ordinated the terminal facilities.

At the present time Shanghai is served by the Pacific Mail Steamship Co., China Mail Steamship Co., W. R. Grace & Co., Robert Dollar Co., Frank Waterhouse & Co., Garland Steamship Co., and the Pacific Steamship Co. These American lines are subjected to competition with Chinese, Japanese and British steamship companies.

The second report deals entirely with Hongkong and Canton. Hongkong is a British port and colony. While it is being served by the same American lines that serve Shanghai, the American interests seem to have deserted this port further south. It is a transshipment port and Mr. Whitham thinks that Americans should revive their interests in it. The port is well equipped with repairing and docking facilities, being able to accommodate vessels up to 700 feet long. The coaling facilities are adequate and fuel oil is supplied by the Standard Oil Co. and the Asiatic Petroleum Co. The first named company supplies only its own steamers whereas the latter will furnish fuel oil to any ship applying.

Hongkong is one of the chief financial centers of the Far East. Canton, only 95 miles distant by water, is an important industrial center. This is the natural port for all trading with southern China.

How to Reduce Insurance

Owners of sailing vessels can save money on insurance by exercising some discretion in placing policies. Some of the more practical owners of this type of craft have already worked this out and have put it into practice. Due to the unsettled conditions in various ports of the world, it frequently takes two to five months to obtain and load a cargo. The vessel loses much time in port, but if the insurance policy is a time policy no concession is possible. Supposing the sailing vessel is engaged in trade between the United States and Africa, the annual insurance rate on her would be 11 per cent. This vessel may obtain a policy to cover the trip risk on the round voyage, including loading and unloading at destination, for 6 or 7 per cent. The voyage may consume from eight to nine months. After the vessel returns home the policy will no longer cover her. But since she may be tied up some time before another charter is signed, the owners can take out a port risk policy at a nominal amount and save money on the year's insurance bill.

The port risk for wooden vessels is 2½ per cent per annum, short rates being charged for a period less than one year. Assuming that it requires four months to collect and load a cargo, the short rate charge would be one-half the annual rate or 1¼ per cent. This rate added to the rate for the round trip voyage would make the combined rate of 7¼ to 8¼ per cent or a net saving of 2¾ to 3¾ per cent by using this method of insurance. At the present time when first-class sailing ships run up in value to the neighborhood of $250,000 this saving should not be overlooked by the prudent owner.

Fishing Men to Build Ships

The Fishing Owners' and Marine Railways' association was recently formed in Seattle as an outcome of the desire of a number of fishing boat operators to enter the building and repair business on a co-operative basis. The entire list of stockholders is made up from owners of fishing and other small vessels which are operated on Lake Washington, Puget sound and Alaskan waters. L. A. Sandstrom heads the new organization, while O. O. Ohvatum is manager and treasurer.

The corporation has secured a five-year lease on the marine ways of the port commission at Salmon bay, and has completed arrangements to take over the plant of the Queen City Boat Building Co. In winter the organization will repair the Alaskan fleets and in summer will build new vessels and repair Lake Washington and Puget sound craft.

Oppose Sale of Ships

That British authorities oppose the sale of any vessels to the American trade has become evident since all buyers from the United States have been refused when bids were made on vessels of British shippers. In several instances the American buyers had completed negotiations as far as possible and then were refused sale on account of orders issued by the British shipping controller.

Since the signing of the armistice,

many American steamship brokers have gone to London for the purpose of chartering and buying British vessels. It is learned that one Philadelphia broker who has been in London for more than two months trying to buy and charter British ships, although he has had orders from his company to buy as many as 20 ships and is well financed, has been unable to obtain one ship.

American shipping agents find it a waste of time endeavoring to buy or charter British tonnages. Despite the fact that the shipping controller has announced that he will approve the sale of steamships over 15 years old to American firms, no Americans have been able to obtain them. American commercial attaches in England have informed the department of commerce that efforts on the part of American brokers to buy British vessels will be absolutely futile.

Government Control Data

Americans are often criticized for their lack of knowledge of shipping technicalities and unjust comparisons are made with the abilities of the British. The story is told of an incident during the war which has been alleged to be the acme of misdirection. This was when the United States government had control of the railroads and the steamship lines, and shipments moved forward on priority orders. Quantities of food and coal were sidetracked while a trainload of anchors for ships upon which work had scarcely begun was hurried from a manufacturing town in the Middle West to the sea.

The British might well point to that as a blunder seldom equaled for absurdity, but now that the war is over and the censorship has been lifted another story is going the rounds. Knowing that the British forces in Egypt would need parapets for their trenches, the British war office sent both the necessary bags and the material to fill them. A shipload of sand was carried in triumph from the British Isles to the edge of the Libyan desert.

To Nationalize Port

It is proposed to nationalize the harbor of St. John, N. B. Auditors have been in the city for the purpose of looking over accounts and records to furnish a report to the federal department of marine and fisheries on the value of the harbor property. It is expected that within a comparatively short time the Canadian government will have a report to enable it to make definite proposals to the city commission. A vote as to whether the citizens desire to retain the port or sell it to Ottawa will probably be taken in the near future.

Soo Canal Report

Freight movement through the Soo canal in May, 1919, shows a decrease when compared with the same period in 1918. The figures are, 10,566,326 net tons for 1919 and 11,404,045 net tons for 1918, a decrease of 837,719 net tons. The comparison of tonnage figures for the past six years follows:

	Net tons
May, 1919	10,566,326
May, 1918	11,404,045
May, 1917	8,807,892
May, 1916	12,293,476
May, 1915	7,348,567
May, 1914	7,488,116

Last month's shipments are 1,727,420 tons less than the amount carried in May, 1916.

Of the total freight carried in May 9,092,947 tons were handled through the United States canal while 1,473,379 tons passed through the Canadian canal.

The following tabulation gives the figures in detail for 1919 and 1918:

	To June 1, 1919	To June 1, 1918
EASTBOUND		
Lumber, M. ft. B. M.	31,405	35,647
Flour, barrels	910,524	858,070
Wheat, bushels	45,825,116	7,074,219
Grain, bushels	13,546,415	10,270,479
Copper, net tons	3,942	14,236
Iron ore, net tons	7,761,553	8,939,350
Pig iron, net tons	35	.....
Stone, net tons	9,640	.....
General merchandise, net tons	13,877	10,403
Passengers, number	602	286
WESTBOUND		
Coal, soft, net tons	2,655,562	1,966,051
Coal, hard, net tons	391,127	166,155
Iron ore, net tons	11,665	14,671
Mfgd. iron and steel, net tons	28,508	7,917
Salt, net tons	22,854	12,835
Oil, net tons	90,958	31,671
Stone, net tons	15,266	50,454
General merchandise, net tons	71,741	54,641
Passengers, number	609	327
SUMMARY		
Vessel passages, number	3,360	2,974
Registered tonnage, net	9,739,171	9,341,015
Freight—		
Eastbound, net tons	9,651,808	9,522,139
Westbound, net tons	3,287,681	2,304,395
Total freight, net tons	12,939,489	11,826,534

May Lake Levels

The United States lake survey reports the monthly mean stages of the Great Lakes for the month of May, 1919, as follows:

Lakes	Ft. above mean sea level April	May
Superior	602.02	602.25
Michigan-Huron	581.02	581.38
St. Clair	575.88	576.38
Erie	573.05	573.69
Ontario	246.43	247.27

Lake Superior is 0.23 foot higher than last month, 0.57 foot higher than a year ago and 0.35 foot above the average stage of May of the last 10 years.

Lakes Michigan-Huron are 0.36 foot higher than last month, 0.28 foot lower than a year ago and 0.86 foot above the average stage of May of the last 10 years.

Lake Erie is 0.64 foot higher than last month, 1.52 feet higher than a year ago and 1.04 feet above the average stage of May of the last 10 years.

Lake Ontario is 0.84 foot higher than last month, 0.14 foot higher than a year ago and 0.59 foot above the average stage of May of the last 10 years.

May Ore Shipments

Shipments of iron ore from the Lake Superior district last month were 6,615,341 tons. Detailed figures follow:

Port	May, 1918	To June 1, 1918
Escanaba	583,463	654,880
Marquette	151,749	151,749
Ashland	669,647	817,005
Superior	1,250,536	1,352,267
Duluth	2,957,338	3,751,387
Two Harbors	1,002,608	1,300,292
Total	6,615,341	8,027,580
1918 decrease	2,176,890	1,000,521

Lake Erie Receipts

Out of a total of 6,615,341 tons shipped from upper lake ports in May, Lake Erie ports received 4,897,166 tons, as shown by figures compiled by THE MARINE REVIEW. The balance on dock June 1 was 0,000,000 tons against 5,650,059 tons on June 1, 1918. Detailed figures are:

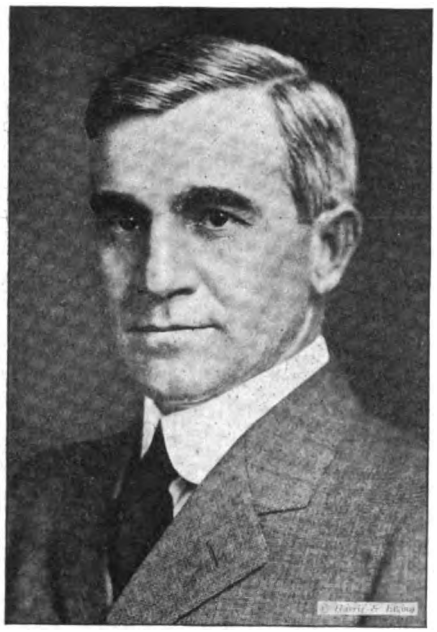
Port	Gross tons
Buffalo and Port Colborne	635,108
Erie	76,240
Conneaut	1,154,376
Ashtabula	850,441
Fairport	376,874
Cleveland	900,937
Lorain	605,167
Huron	143,860
Toledo	85,414
Detroit	68,749
Total	4,897,166

The Hill Steamboat line is operating this year the steamer CHARLES MCVEA between the ports of Kenosha and Waukegan, Wis., and Chicago. This is the route which has been served by the company since the organization of the line in 1903 by Ludlow Hill, who is still manager of the line. This was the first steamboat line to attempt this run and the service is well developed.

Marine News in a Personal Way

Intimate Gossip About What Leaders in the Maritime World Are Doing

HOMER L. FERGUSON, president and general manager of the Newport News Shipbuilding & Dry Dock Co., Newport News, Va., has been elected president of the United States chamber of commerce. Mr. Ferguson was born in Waysville, N. C., in 1873 and was educated at the United States naval academy from which he graduated in 1892. Later, he attended Glasgow university, Glasgow, Scotland, graduating in 1895. For 11 years he was a United States naval constructor. He resigned from the navy in 1905 to become general manager of the Newport News company. He is a member of the Society of Naval Architects and Marine Engineers, the Society of Naval Engineers, the Engineers' club, New York, and the Army and Navy club, Washington. Mr. Ferguson has been a member of the board of directors of the United States chamber of commerce since 1914. He has been actively identified with the work of the chamber since he became a member. His was the only name placed in nomination and the vote, which was taken by mail, was unanimous.



HOMER L. FERGUSON

* * *

CAPT. I. A. PEDERSEN has been appointed traffic manager of the port commission of Seattle to succeed E. J. FROMAN who has retired to enter business for himself. Captain Pedersen began his transportation and traffic career in St. Paul when a boy. He was first employed in the St. Paul offices of the Northern Pacific railroad. Later he was transferred to the company's general offices. In 1905 the railroad transferred him to Spokane, Wash., as freight rate and chief clerk. Later, he became an auditor of the Spokane & Inland Empire railroad, resigning to join the state bureau of inspection where he remained for six years. During the war he served with the depot quartermaster at Seattle and later at New York. After his discharge, he had charge of Seattle's terminal offices until he received his present promotion.

* * *

WALDO S. REED has been elected vice president of the Emergency Fleet corporation. Previous to this appointment he was the corporation's treasurer. In his new capacity he still will have charge of finances. Prior to his election as treasurer, Mr. Reed was engaged in banking in New York and for 20 years he was associated with the banking firms of Edward Sweet & Co., and Hodenpyl Hardy & Co.

* * *

F. X. NEENAN has been appointed advertising manager of the Walter A. Zelnicker Supply Co., St. Louis. Mr. Neenan has had considerable executive experience having been connected with Fairbanks, Morse & Co. for six years, the Atchison, Topeka & Santa Fe railroad, coast lines, for two years and the St. Louis Smelting & Refining works of the National Lead Co. for two years.

* * *

H. MEACHEM has been appointed district sales manager at New York for the Dean Bros. Steam Pump Co., Indianapolis. The Dean company, among other kinds of pumping machinery, makes marine equipment.

* * *

CAPT. PAUL FOLEY, U. S. N., has been appointed chartering and tank steamer executive for the Emergency Fleet corporation to succeed W. H. A. WALKER who recently resigned to take charge of the transportation business of the Island Oil & Transportation Corp.

* * *

H. MCL. HARDING, New York, consulting and supervising engineer, has been engaged by the Milwaukee harbor commission to take charge of the design and construction of the proposed municipal docks and freight terminals on Jones island. Mr. Harding is a graduate of Yale university, and has had a wide experience in the line of work in which he is engaged.

* * *

CAPT. P. C. FILLY who has been employed by M. H. Tracy & Co., Inc., New York, as marine superintendent, has decided to go to sea again and at his own request has been appointed master of the steamship CORRALES. Captain Filly is a graduate of the New York nautical schoolship ST. MARYS, class of 1880.

CAPT. I. A. PEDERSEN

* * *

DANIEL H. COX, having resigned his position as manager, ship construction division, Emergency Fleet corporation, has resumed his original business with the firm of Cox & Stevens, naval architects, marine engineers and vessel brokers, with offices at 15 William street, New York.

* * *

W. R. CHISHOLM now has charge of the import and export department New York branch of the Universal Trading & Shipping Co., Seattle. Formerly Mr. Chisholm had charge of the same department in the company's home office on the West coast.

Marine News in a Personal Way

Intimate Gossip About What Leaders in the Maritime World Are Doing

H. E. FRICK has been appointed Northern Pacific district manager of the Emergency Fleet corporation to succeed CAPT. W. A. MAGEE who retired recently. Prior to his appointment, Mr. Frick was assistant to the manager of the International Shipbuilding Corp., builders of the Hog island plant. He was born in Baltimore and has been engaged in shipbuilding practically all his life. He began his career in Belfast, Ireland, at the Harland & Wolff plant, remaining with that company for five years. This training gave

H. E. FRICK

him a thorough knowledge of shipbuilding, both from a technical and practical point of view. Then he returned to the United States to serve in a number of shipyards, among them being that of the Fore River Shipbuilding Corp., Quincy, Mass. His work at the Fore River plant was confined principally to the supervision of hull construction and of all naval work. He supervised the construction of the battleships NORTH DAKOTA and NEVADA for the United States navy and the battleship RIVADAVIA for the Argentine government. Mr. Frick joined the Emergency Fleet corporation in September, 1917, as authorized representative at the Merchants Shipbuilding Corp.'s yard at Harriman, Pa. Here he was in charge of construction work at the plant and townsite, in addition to supervision over the plans for inspection of hulls and machinery on vessels under contract. He remained at Harriman from September, 1917, to February, 1919, when he was transferred to the Hog island plant in a similar capacity. He was then assigned to his present post.

* * *

CHARLES H. STODDARD has been appointed consulting marine engineer of the Heine Safety Boiler Co., St. Louis. He was born in California and received his technical education at Stanford university where he specialized on mechanical engineering. From 1895 until 1900 he was employed in shops and drawing rooms in Cleveland and other Ohio cities and in Pittsburgh. Then he returned to the Pacific coast to enter the employ of the Union Iron Works, San Francisco. Later he was chief engineer of the Fulton Iron Works and of the Risdon Iron Works, both of San Francisco. For nearly three years he was civilian superintendent of the shops at the Mare island navy yard. In 1916, he entered the employ of the Moore & Scott Iron Works, San Francisco, as chief engineer. In this position he supervised the design of a variety of marine equipment. He left this company to accept his present position.

* * *

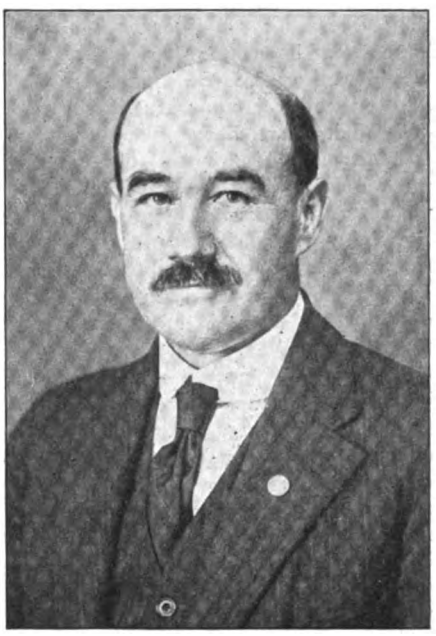
J. W. MCCABE has been appointed special representative for the foreign trade department of the Chicago Pneumatic Tool Co., Chicago. Mr. McCabe will make an extended trip through the Orient, the Philippines and Australia. Formerly he was district manager of sales for the company in Buffalo. W. H. White will take charge of the company's Buffalo territory during Mr. McCabe's absence.

* * *

THOMAS A. SCOTT has been appointed a commissioner of the United States shipping board to succeed Bainbridge Colby who resigned some weeks ago. Mr. Scott is president of the P. A. Scott Towing, Pile Driving & Wharf Building Co., and of the Scott Investment Co., both of New London, Conn. He is a lieutenant commander in the United States naval reserve force. He was enrolled in this service in 1918 and made his headquarters in Washington where he served under the direct supervision of Admiral Taylor, chief of the bureau of construction and repair. His appointment together with that of Henry M. Robinson last month fills up the board's membership again. The other members are E. N. Hurley, Raymond B. Stevens and John Donald.

* * *

WILLIAM A. COXE was re-elected president of the Atlantic Coast Shipbuilding association at its recent annual meeting in Philadelphia. Mr. Coxe was formerly president of the Harlan & Hollingsworth shipyard, Wilmington, Del., and is now consulting marine en-



CHARLES H. STODDARD

gineer in charge of the Pusey & Jones Co. shipyards at Gloucester, N. J., and Wilmington, Del. Other recently elected officers of the association are: F. P. PALEN, vice president; HENRY C. HUNTER, secretary and W. T. SMITH, treasurer.

* * *

J. H. WHISTLER has become associated with Kelly & Harrett, foreign freight contractors and forwarders, New York. He will assume entire charge of forwarding. Formerly Mr. Whistler had charge of the forwarding department of Lambert & Holt and later with Lunham & Moore.

* * *

I. J. PEAT has recently been elected president of the Marine Equipment Co., Mobile, Ala.

How Turbine Problems Were Met

An Expert Study of the Work Done in Perfecting Installations on the 5000-Ton Vessels—Tooth Design Was Changed

By Francis Hodgkinson

FROM various reports that have been circulated during the past few months, it might be concluded that geared turbine machinery, for the propulsion of ships, has been by no means an unqualified success and that there has been much difficulty not only in getting this machinery to operate properly but also from the necessity of laying up ships for repairs. While some troubles have been encountered in actual service, these have not been more than are to be expected with any other types of machinery; particular consideration being given to the fact that the operating engineers generally have not been familiar with what would otherwise be more reliable and economical apparatus.

Publicity has been given to some troubles incidental to the getting into operation of the 5000-ton deadweight cargo ships being built by the Submarine Boat Corp., Port Newark, N. J. These troubles occurred while the machinery was in the hands of the builder, and in no case were they breakdowns which occurred after the vessels had put to sea. The troubles, it is to be conceded, were of a serious character inasmuch as they apparently embarrassed the shipbuilders seriously. They were the result of a combination of circumstances, not least of which was the production of machinery in a new establishment with a new organization and with all the difficulties incidental to wartime conditions. Nothing inherently new in the principles of design was employed, in fact, every element had been in successful commercial operation for many years.

One of the troubles which bears no relation whatsoever to workmanship was the particular form of involute tooth employed, which had been found eminently satisfactory on a large number of land and marine installations, including cases where as much as 6000 horsepower was transmitted over a single pinion during a period of six years. It appeared, however, that for these slow-speed cargo ships, where a speed as low as 90 revolutions per minute was involved, this particular form of tooth did not lend itself to maintaining an oil film between the tooth surfaces as effectively as other forms of involute teeth. While this was a simple matter, readily corrected, it unfortunately was not in evidence at the commencement of the trouble because so many other things which were the result of bad workmanship, were discovered, one after the other.

These matters would probably all have been eliminated, however, had proper tests been carried out in the builder's works, which under ordinary circumstances, would have been done. In this instance, however, the builders felt that all that could be done toward accelerating the production of the machinery during the urgency of war needs was of more paramount import, or that instead of carrying out full speed trials, they were content to operate the gears by means of electric motors, imposing upon them the full-load tooth pressures but at approximately 5 per cent of the full load revolutions. This served to determine that the tooth contacts occurred throughout the whole axial length of the gears.

Gear Teeth Cause Trouble

The first of the vessels to be built was the AGAWAM, which was ready for dock trial about the middle of September, 1918. Difficulties were at once encountered in getting the condenser auxiliaries in operation on account of the faulty pipe fitting in the vessel. The tooth surfaces of the gears became injured as soon as any material load was imposed on them. It was immediately concluded that the lubrication was inadequate and some changes were made to the lubricating system, which as subsequent events proved, had nothing to do with the trouble. However, after the tooth surfaces were smoothed up, the gears operated in a satisfactory manner, although, of course, since the vessel was light, full power could not be imposed on her machinery.

The vessel proceeded to New York in order to be loaded for her first voyage. The loading, however, could not be carried out on account of certain of the holds becoming filled with fuel oil, and on this account the vessel lay in the harbor for a considerable period, during which time a river trial was carried out. On this trial machinery operated in an entirely satisfactory manner.

The vessel then proceeded on a loaded sea trial toward the last of October, and after steaming for two hours, with everything apparently operating well, heating of the machinery indicated trouble and there occurred further abrasion of the tooth surfaces. At the conclusion of the trial, a careful examination of the machinery was made and while subsequent events proved conclusively that the scoring of the surfaces gave the necessary relief to the tooth form, and that the gears would have operated perfectly well, provided no other defects were present,, yet on account of the many apprehensions concerning the machinery held by people other than the builders, it was considered expedient to remove the gears completely and replace them with others. Examination at that time showed that the pinion bearing was badly scored, which was the result of improper fitting of the bearings, and this was considered by some to have been the cause of scoring of the teeth.

Occurrences of this charcter led to careful examination as to probable causes, and, as stated before, many things were discovered, particularly faulty workmanship, which concealed the principal defect, the form of tooth. In these examinations, the oiling system was subjected to careful consideration, and with the installation of new gears unquestionable improvements were made in the arrangement for supplying oil to the teeth. While it is now evident that lack of oil had nothing to do with the scoring, improvements were made to the machinery by altering the oiling system. The new gear was one of many intended for other ships, and was placed in service without any detailed examination of its parts.

The installation of the new gear required an inordinate amount of time, the work having been carried out partially at a dock and partially while the ship was moored in the river with days of delay while in need of a crane. It was not until the end of November that the vessel was again ready for trial. In setting these gears, the position of the turbine had to be entirely changed, which indicated at once that the alignment of the original gears had been wrong. This in itself would account for the cutting of the tooth surfaces.

The author is chief engineer of the Westinghouse Machine Works, East Pittsburgh, Pa.

The supposition was that the pinions at one end were jammed tight in mesh, and after this was corrected no further trouble was expected.

The trial, however, resulted again in an abrasion of the gears, together with a scoring of pinion bearings which later were found to be directly due to improper fitting, all the load being carried on one bearing instead of being distributed on the three. The tooth surfaces were smoothed up and a more complete examination was made, which showed that the floating frames were not properly set, and were located in such a manner that the frame was unable to float and distribute the tooth load equally between the two helices. This feature is regarded as of paramount importance in large gear construction, and in itself again might account for the injury to the tooth surfaces. These matters were corrected by the beginning of December.

A 24-hour, full-power, loaded trial was then proceeded with, at which time the machinery operated excellently. The tooth surfaces, however, had become abraded in earlier trials which had automatically provided the necessary relief, and their behavior was excellent. This vessel proceeded to sea and after various vicissitudes has accomplished her first voyage, during the whole of which the turbines and gears operated excellently. Upon some days out from her home port, the boilers were found to be salty and were delivering large quantities of salt into the machinery. On some three occasions the steam strainers had to be removed for the purpose of cleaning the salt therefrom. There were complaints of considerable fuel oil in the boilers, which, together with the scale-preventing compounds, caused excessive foaming. In view of these circumstances, the vessel returned to New York and later attempted another voyage, this time putting into Bermuda on account of her inability to maintain steam. It is reported that difficulties were encountered on account of the heating and pumping of fuel oil. Following this, the vessel completed her voyage without further incident and with complete satisfaction so far as her propelling machinery was concerned.

In the meantime, work was proceeding on succeeding ships. The next vessel, the ALCONA, had her machinery assembled and defects of workmanship corrected, as had been done on the AGAWAM. Nevertheless, scoring of the tooth surfaces was encountered, and it was for the first time realized that the fundamental difficulty was on account of the particular form of involute tooth. Corrections were made to these teeth by relieving the tips of the pinions, which while reducing the arc of contact, and hence increasing the tooth pressures, enabled the gear teeth properly to maintain their oil film and work in an entirely satisfactory manner. The four succeeding ships were immediately treated in this manner and two of them, the ALCONA and ALAMOSA, are now at sea. For later ships, the gears have been returned to the manufacturer and new pinions have been provided which have been cut with a more approved form of involute teeth. The first of the ships thus fitted has completed her light power trials, There are now on the ground, available for the shipbuilders, a number of complete sets of gears.

Has Launched 33 Ships

The American International Shipbuilding Corp. from its Hog island yard at the end of May, had launched 33 vessels, of which number 19 had been delivered. On May 30, five vessels were launched within 80 minutes. These were 7800-ton steel freighters. The first vessel to be launched by the yard was the QUISTCONCK which took the water Aug. 5, 1918. The 33 vessels have thus been launched within a period of 9½ months.

Develops Welding Fillers

Seven or eight years ago, the Central Steel & Wire Co., Chicago, points out, iron wire with a small percentage of carbon was used in all welding operations. The company has carried on exhaustive experiments to adapt the correct material to all classes of welding so that at the present time it has developed materials to cover various classes of work. The company's products are now used for acetylene and electric welding on cast iron, cast steel, vanadium steel, nickel steel, chrome nickel steel and railroad track work. It is pointed out that by using the proper medium for each material to be welded, the efficiency of the process and the strength of the finished work is improved.

Explains Trade Routing

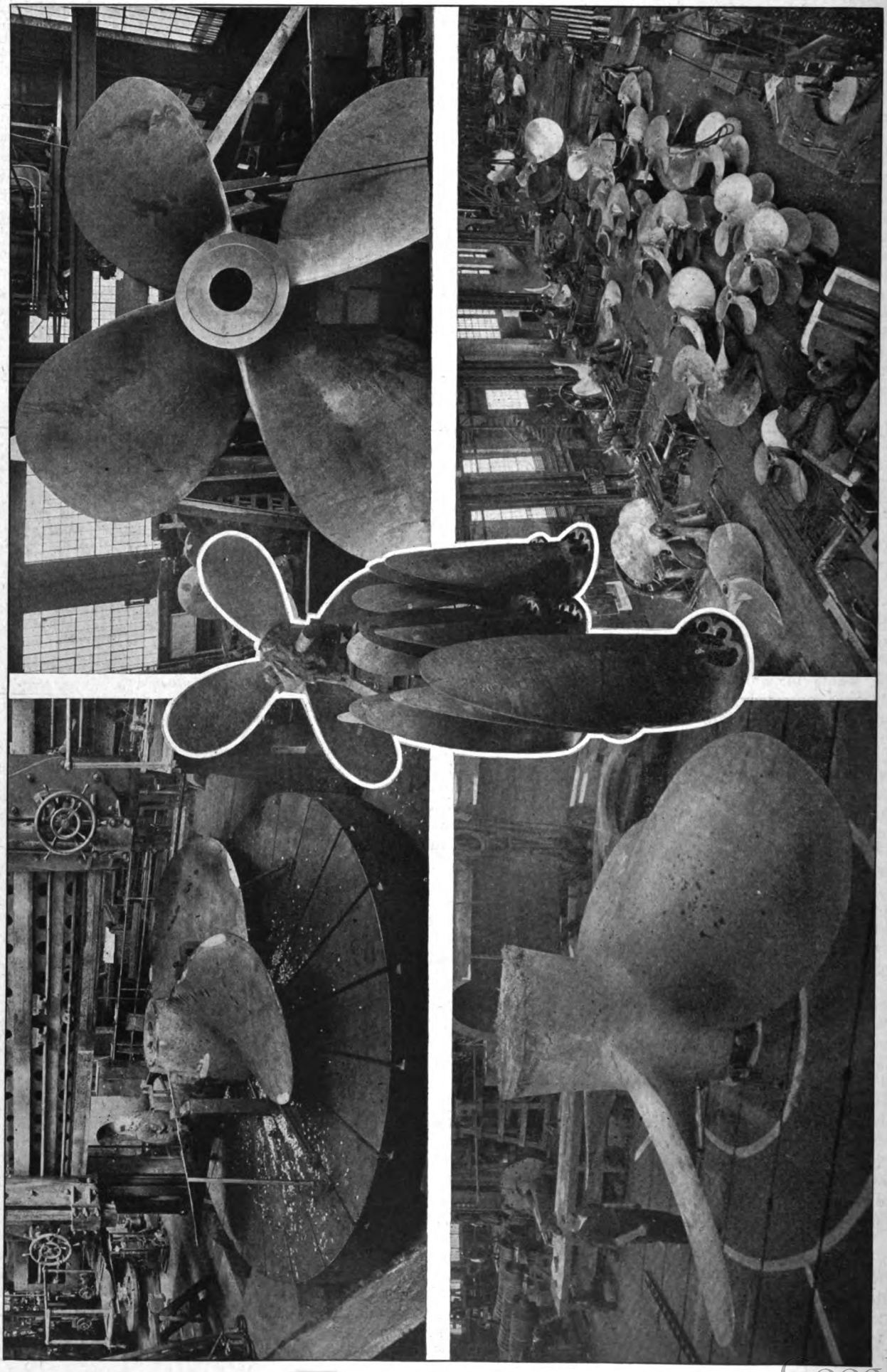
The Irving National bank, New York, has just issued a book, *Trading with the Far East,* which is a companion volume to *Trading with Latin America.* It gives facts and information for the man who is too busy to gather them first hand, and outlines effective ways of meeting the problems arising in connection with the routine of trade activity in the Orient. In acquainting the manufacturer or exporter with outstanding factors in trade beyond the Pacific, it provides an interpretation for commercial purposes of conditions in what promises to be an excellent market for years to come.

Makes Excellent Record

On May 30, the Submarine Boat Corp., Newark, N. J., completed a launching record of 52 vessels in 52 weeks. In the last six days of the fiscal year seven vessels were launched. At the same time deliveries of vessels at the corporation's yard are rapidly catching up with the launching program. Twenty-seven vessels are now complete, 16 having been delivered during May. The yard's record for the fiscal year ended May 30 follows:

Way No.	Launched	Name	Comp'eted
1	May 30, '18	Agawam	Oct. 1, '18
2	July 4, '18	Alamosa	March 26, '19
3	July 4, '18	Alcona	March 16, '19
4	Aug. 31, '18	Ingold	April 7, '19
5	Sept. 12, '18	Charlot	April 9, '19
6	July 4, '18	Chetopa	
7	Sept. 22, '18	Cokato	Feb. 27, '19
8	Nov. 23, '18	Decatur Bridge	May 2, '19
9	Dec. 15, '18	Ft. Pitt Bridge	April 23, '19
10	Sept. 12, '18	Monana	
11	Aug. 31, '18	Phoenix Bridge	March 27, '19
12	Nov. 23, '18	Chicago Bridge	May 8, '19
13	Dec. 15, '18	Mt. Vernon Bridge	April 17, '19
14	Sept. 22, '18	Panola	May 3, '19
15	Sept. 28, '18	Onekama	April 18, '19
16	Feb. 8, '18	Jekyl	May 12, '19
17	March 2, '19	Milwaukee Bridge	
18	Oct. 6, '18	Hico	April 6, '19
19	Oct. 6, '18	Opelika	May 9, '19
20	Feb. 16, '19	Passaic Bridge	May 15, '19
21	March 12, '19	Opequan	May 29, '19
22	Oct. 14, '18	Allies	May 27, '19
23	Oct. 14, '18	Consort	May 19, '19
24	March 2, '19	Bethlehem Bridge	May 29, '19
25	April 13, '19	Wisconsin Bridge	
26	Dec. 28, '18	Faraby	May 26, '19
27	Jan. 25, '18	Farnam	May 7, '19
28	April 19, '19	Jackson	
1	March 27, '19	Louisville Bridge	
3	Feb. 16, '19	National Bridge	May 26, '19
6	Feb. 8, '19	Nesco	May 20, '19
2	Feb. 16, '19	Masca	May 23, '19
11	March 27, '19	Knoxville	
4	March 30, '19	Anniston	
10	March 30, '19	Chattanooga	May 28, '19
5	March 31, '19	Montgomery	
14	April 9, '19	St. Augustine	
7	March 12, '19	Bound Brook	
15	April 30, '19	Brasher	
18	April 26, '19	Johnson City	
19	April 19, '19	Shortsville	
22	April 30, '19	Jefferson County	
23	April 13, '19	Hillsborough County	
12	May 15, '19	Dade County	
8	May 15, '19	St. Johns County	
9	May 27, '19	Davidson County	
13	May 27, '19	Wallkill	
3	May 30, '19	Assinippi	
27	May 24, '19	Boston Bridge	
6	May 24, '19	Bay Head	
2	May 30, '19	Calno	
24	May 30, '19	Pawtucket	

Reports from Norfolk, Va., state that a contract has been signed for the construction of a $7,000,000 shipbuilding plant for the Norfolk-Hampton Roads Dry Dock & Ship Repair Corp., at Lambert's point. The site comprises about 160 acres of land.



AT THE UPPER LEFT IS SHOWN THE OPERATION OF BORING ONE OF THE PROPELLERS FOR THE LEVIATHAN—THIS MACHINE HAS A 34-FOOT PLATEN—THE ILLUSTRATION AT THE UPPER RIGHT SHOWS ONE OF THESE PROPELLERS READY FOR SHIPMENT—AT THE LOWER LEFT IS SHOWN THE SAME PROPELLER AS IT CAME FROM THE FOUNDRY—THE PROPELLERS SHOWN AT THE LOWER RIGHT ARE FOR DESTROYERS WHILE THE MACHINES AT THE LEFT OF THIS ILLUSTRATION ARE FOR MACHINING THE BLADES—THE CENTER ILLUSTRATION SHOWS THE BUILT-UP TYPE OF PROPELLERS USED IN THE MERCHANT SERVICE—THESE VIEWS ARE AT THE WILLIAM CRAMP & SONS SHIP & ENGINE BUILDING CO., PHILADELPHIA

Eastern Yard Makes Big Propellers

Shipyard Foundry and Machine Shop Makes Propellers as a By-Product —Spare Propellers for the Leviathan Are Among Its Products

NAVY work carried on during the war by shipyards on the eastern coast will doubtless be described in full at some future date. At the present time, however, only partial information regarding this important branch of war work has been made public.

The plant of the William Cramp & Sons Ehip & Engine Building Co., Philadelphia, is one which holds much of interest, but concerning this yard only one feature has as yet come to light. This relates to the work of the plant in producing propellers. The Cramp yard has long been known as a unit plant where nearly everything going into a vessel is made from the raw material. The many improvements and extensions made to take care of the rush of naval work has resulted in a plant which is now able to turn out by-products.

The brass foundry was originally started by three of the grandsons of the yard's founder, later being merged with the shipyard proper. The old foundry comprises but one corner of the present foundry. At the beginning of the war it produced 260,000 pounds of castings a month. It reached a production of 600,000 pounds per month within 14 days and its production now is approximately 1,000,000 pounds a month. In this foundry more than 60 compositions of metals are used in making the finished articles. The completeness of the work is illustrated in the fact that within the confines of the yard fittings of every nature are made. Not only are propellers produced for the naval vessels under construction on the Cramp's ways but for other shipyards as well, and fittings and castings are produced for automobile and other work.

One new wing of the foundry has been devoted to making propellers exclusively and has made destroyer propellers in quantity.. The plant also has an iron and a steel foundry. The Cramp yard recently made two extra propellers for the troop ship LEVIATHAN. These propellers weighed 56,000 pounds each, as they left the brass foundry in the rough and 41,000 pounds each as they were shipped after machining.

The boring mill in which this propeller was completed has a table 34 feet in diameter. The LEVIATHAN propellers are said to be the largest bronze castings ever made in the United States and the problem of casting them to prevent defects in hubs and blades that would render them unfit for use was successfully met. The yard also cast and machined over 800 large propellers varying in size from about 5 feet to 19 feet. Some were for the Ford eagle boats. Over 400 vessels were supplied with propellers from the Cramp yard, including practically all the war vessels built in the United States and a great many of the cargo vessels and transports.

Birth of the Schooner

WHERE the names of vessel types and other nautical expressions originate is often a question of conjecture. The word schooner to designate a vessel with two or more masts, fore and aft rigged, however, was coined in 1745 at Gloucester, Mass., when Andrew Robinson built a fishing vessel with a square stern, fitted with two masts, bearing a fore and aft sail on each and a bowsprit carrying a jib. The word scoon was a common, colloquial expression in New England at that time to describe the skipping of a flat stone over the water when skilfully thrown from the shore. When the vessel in question took the water, due to her fine lines she shot quite a distance from the launching ways. "See her scoon," remarked a bystander. The builder of the craft was at a loss for a name for the type of vessel he had created and he replied: "A scooner let her be." This name has been used since that time, although the spelling has been changed to schooner.

The Cramp foundries turned out for the vessels built at that yard and at several other shipyards over 1,000,000 pounds of bronze, over 2,000,000 pounds of steel and over 3,000,000 pounds of iron castings per month. A total of 30 propellers were constructed for the Emergency Fleet corporation. Each propeller weighed 50,000 pounds including one cast-iron hub, four propeller blades of manganese bronze and two spare propeller blades of the same metal for each wheel. Some of the propellers produced for the Fore River Shipbuilding Corp. weighed 35,000 pounds, including the sinkhead, and weighed 25,000 pounds when shipped.

Quantity production, however, was accomplished with propellers for destroyers. These were 9 feet in diameter and weighed 7500 pounds each in the rough. The driving faces of the wheels were machined with extreme care, and the wheel polished and balanced to meet the naval specifications. Supplies of finished castings of all kinds were produced in the brass foundry and shipped to the New York Shipbuilding Corp., and to the Newport News Shipbuilding & Drydock Co., as well as other yards.

The Cramp yard, it is now understood, has sufficient contracts on hand for naval vessels to keep it busy a year. When the government requisitioned its facilities, the plant had on hand some contracts for merchant construction, but its ways are now practically cleared of this work. The yard's by-products were developed through war necessity and with the larger facilities it now has, the plant has been enabled to produce many supplies for other yards and for some manufacturing lines. In this respect the effect of the war work has had a notable influence.

Visit Lorain Yard

More than 400 engineers from northern Ohio were the guests on June 10, of the American Shipbuilding Co. at Lorain, O. The engineers inspected the large yard at Lorain and had the opportunity of seeing vessels in all stages of construction and of fitting-out. J. C. Workman recounted the war work of the company in a special address on board the steamer CITY OF BUFFALO enroute from Cleveland to Lorain.

The 1920 meeting of the National Foreign Trade council was held at San Francisco recently. This was the first of these conventions to be held on the Pacific coast, previous meetings being at Washington, New Orleans, St. Louis, Pittsburgh, Cincinnati and Chicago. The choice of San Francisco recognizes the importance of the western coast in shipping circles.

Practical Ideas for The Engineer

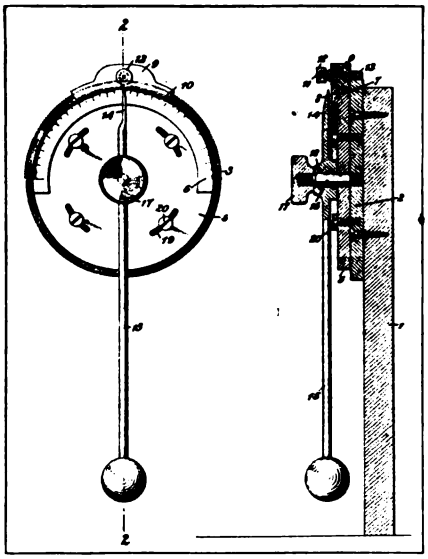
List Gage—Engine Fuel—Concrete Anchors—Thrust Bearing Data—Ships Boilers Complete—Use for Scrap Plate—Ship Scale—New Sternpost

A RELIABLE list gage, by means of which the trim of a vessel may be instantly noted, is a valuable adjunct, both at sea and at the dock while loading cargo. Devices of this kind have, of course, been in use for many years. With the object of providing a device capable of fine adjustment, and for reading readily the exact amount of list at any time, the device shown in the accompanying illustration was recently developed by John Frame, Searsport, Me. This device is patented.

Aside from furnishing a ready means for determining the list of the vessel at sea, the inventor points out that when several gages are installed in different parts of the vessel it is a comparatively simple matter to keep the ship properly trimmed while stowing cargo. Otherwise, he points out, the vessel can be hogged, sagged, or twisted while loading, often to the degree of injuring her permanently.

For determining the list of the vessel, the device is mounted athwartships on a bulkhead, or convenient partition. By mounting the device fore and aft, however, the pitch of the vessel can also be readily ascertained.

In the accompanying illustration, the view at the left is a front elevation while a cross section of a side elevation is shown at the right. The upright to which the device is mounted is shown at *1*. The plate, *2*, which forms the back of the device, is placed in position by means of screws. The top of this plate is equipped with a gear sector, *3*, which meshes with the pinion gear, *13*. The dial plate, *5*, is mounted on the plate, *2*. This dial plate is equipped with a scale graduated to read in degrees and is further provided with a groove, *7*, in which a member, *8*, is fitted. This member is T-shaped and fits in a slot machined to accommodate it. Made integral with the T is the unit, *9*, which is provided with a vernier scale, *10*, for the purpose of close readings.



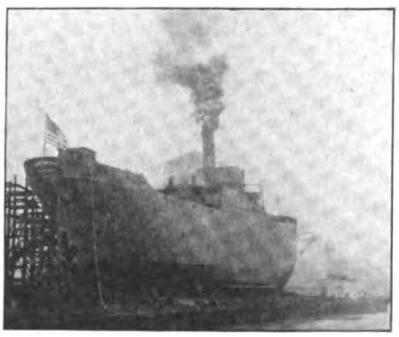
ADJUSTABLE INDICATOR FOR REGISTERING SHIP'S MOVEMENTS

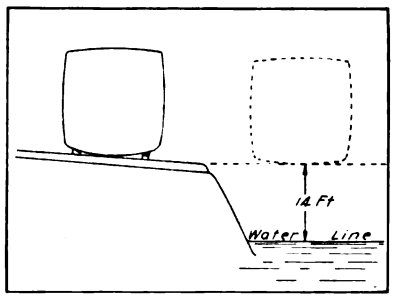
Unit, *9*, is provided with a shaft, *11*, which carries the pinion, *13*. This shaft is actuated by a hand knob, *12*. When the pinion is actuated, unit, *9*, is moved to the desired extent to make indications with the scale, *6*.

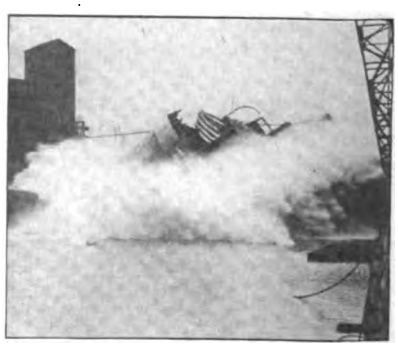
For the purpose of determining the list or pitch of the vessel, the pointer, *14*, which is attached to the pendulum, *15*, is fulcrumed on the stud, *16*. This stud is equipped with ball bearings, *18*, and a lock nut, *17*. For adjusting the dial in correct relation to the

Lake Vessel Drops 14 Feet to Strike Water When Launched

WHEN the steel cargo carrier LAKE FUGARD took the water at the American Shipbuilding Co.'s yard at Buffalo recently, she furnished one of the most spectacular launchings ever held on the Great Lakes. She is a 4200-ton vessel built for the Emergency Fleet corporation and when she took the water she was practically completed and ready for commission. She even had steam up in her boilers. She was launched sidwise, according to Great Lakes practice. While vessels in times past have dropped a considerable distance from the ends of the launching ways before striking the water, there is no record of a vessel dropping the distance the LAKE FUGARD did, that is, 14 feet. The slip into which the craft was dropped is comparatively narrow and when the steamer struck the water she listed so far to starboard that her funnel cleared the loading machinery on the opposite dock by a matter of inches. When the vessel righted it was found that she had shipped considerable water, there being 3 feet in her hold. The view at the left shows the vessel with steam up all ready for launching, the center view is a diagram showing the space she dropped before striking the water while the illustration at the right graphically shows how sharply she heeled over before righting. The LAKE FUGARD is now in commission on deep water. The exceptional launching conditions attracted many shipbuilders and vessel men, among them being Henry Penton, district manager for the Great Lakes district of the Emergency Fleet corporation.







pointer slots, *19*, are provided with screws, *20*. By this means, the dial plate is readily clamped in the desired position.

In operation, after the device is installed aboard the vessel, the pendulum is allowed to swing freely as the ship moves. The amount of the movement is registered by the pointer, *14*, over the scales, *6* and *10*. When it is desired accurately to register the motion of the vessel at any time, the lock nut, *17*, is fastened to hold the pendulum in place when it has swung to an extreme position. By this means, it is pointed out, the scales may be read at leisure.

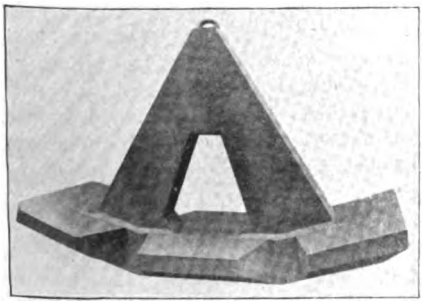
Fuel for Diesel Engines

A writer in *Journal für Gasbeleuchtung*, discusses a method of filtering coal tar for use in diesel engines which is said to be both simple and effective.

The tar is pumped into a receptacle of about 3 cubic meters capacity. In this holder it is heated up to 60 degrees Cent., for 4 hours, and then left to stand for 10 hours to allow the pitch and other impurities to settle down. Then one-third of the contents of the holder is run from the top and forced through three filters, the latter being heated to 40 degrees Cent. The product is then conveyed to the holder for the purified material, from which it is led directly to the engines. The tar is warmed up to 40 degrees Cent., before being introduced into the engine. This is effected by means of a gas heating device below the tar pipe. To obtain the best results, it is pointed out that the piston of the engine should be cleaned once in four months. The cylinder walls and piston rings are, however, no more liable to be clogged than when crude heavy oil is used.

Concrete Anchors

The device shown in the accompanying illustration is a concrete anchor recently developed by the Inter-Ocean

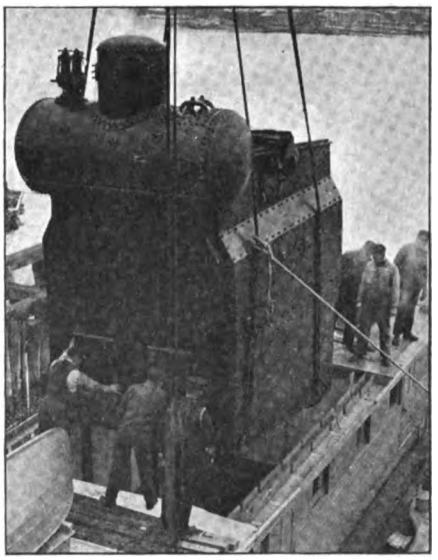


CONCRETE MOORING ANCHOR WEIGHING 8000 POUNDS

Barge & Transport Co., Seattle. The company makes these anchors in various sizes from 1 to 8000 pounds. The anchor illustrated is the 8000-pound type. It is 8 feet 2 inches in height. These anchors are strongly reinforced with steel bars and are equipped with a mooring ring at the top. They are cast in wooden molds. They are extensively used by Alaska fishermen for floating fish traps and buoys, but are designed for any purpose where a substantial mooring anchor is desired.

Thrust Bearing Data

The substitution of a single collar for a multicollar thrust bearing on the average merchant ship or transport would result in the saving of about 0.5 per cent, according to H. G. Reist in the *General Electric Review*, of the total power, coal and size of boilers. Thus the conservation of fuel would be material, and economy would be effected in first cost and increased cargo space would also be obtained.



LOWERING A COMPLETE BOILER IN PLACE IN A GOVERNMENT HARBOR TUG

The imperfect fitting and adjustment of multicollar bearings renders it impossible to maintain oil films between all of the bearing surfaces, and the losses are correspondingly great. Calculations for two thrust bearings for 50,000 pounds thrust mounted on shafts running at 90 revolutions per minute show that the losses for an 8-collar bearing are 11.5 horsepower as compared with 1 horsepower for a single collar bearing.

Ships Boilers Complete

Transporting marine boilers completely assembled, including furnace linings, is a comparatively new departure in marine construction work. This method of shipping boilers was successfully accomplished by the Bridgeport Boiler Works, Bridgeport, Conn., in filling a government order for 12 marine boilers of the modified watertube type, a smaller unit of the Emergency Fleet standard boiler.

These boilers are rated at 350-horsepower and built to operate safely at 150 pounds steam pressure. Each has 261 three-inch tubes and 9 four-inch tubes with a grate surface of

STEEL LADLE HOOK MADE FROM SCRAP SHIP PLATE

50 square feet and a heating surface of 1800 square feet. They were built especially for the 88-foot government harbor tugs.

Shipment by water from Bridgeport to City Island, N. Y., was carried out by loading the boilers on harbor tugs. On arrival at City Island, the boilers were then lowered directly into place in the holds of the waiting government tugs. The boilers as shipped measured 13 feet long by 13 feet 6 inches high and 8 feet 3 inches wide, weighing approximately 23 tons each.

The linings were laid up with a high temperature cement, furnished by the Quigley Furnace Specialties Co., New York. Success in shipping by water prompted the producers to ship some by rail. When going forward by rail, however, it was necessary to ship the settings and the tubes and boilers separately. Three boilers went to City Island, three to Clayton, N. Y., three to Camden, N. J., and three to Newburgh, N. Y. The Camden and Clayton shipments were forwarded by rail.

New Use for Scrap Plate

Odd pieces of scrap steel plate which accumulate in steel shipyards represent a substantial loss annually as their monetary value as scrap material is comparatively low. The accompanying illustration shows how scrap plate was recently utilized in a shipyard for making large built-up hooks. These hooks are used in steel mills for handling heavy ladles of molten metal and, it is said, for all practical purposes they are as efficient as hooks made from solid material in the regular way.

The hook shown is 8 feet long and is built up from 10 plates. Four inner full-length plates are ½-inch material, reinforced by two full-length plates made from ⅞-inch stock. Two half-length plates, one on either side,

are made of ½-inch material while the hook proper is further reinforced by slightly shorter outer plates ⅞-inch thick. The plates are securely fastened together through the medium of several countersunk-head rivets. In making the hook, the plates are first marked with the desired outline by means of a template. They are then cut to the desired contour with an autogenous cutting torch. The plates are then drilled and riveted together. It is pointed out that the laminated construction is comparatively strong and that a decided economy results as scrap material only is utilized. A number of these hooks are in use at present.

Design Scale for Weighing a Ship

REVIVAL of the merchant marine is taxing the ingenuity of American inventors to perfect labor saving and other equipment for the economical maintenance of vessels. This has resulted in the development of numerous devices for use both in the design and construction of vessels and in their equipment. The device shown in the accompanying illustrations was recently patented by John Frame, Searsport, Me. It is a scale devised accurately to weigh a vessel and its cargo. The design reveals considerable study. It is said that the scale may be located in any convenient place as regards fore-and-aft position and that it will give correct readings, regardless of whether the ship is on an even keel or listed. It also gives the draft of the vessel by means of graduations provided for this special purpose on the scale beam.

Fig. 1 is a detailed section of the device while Fig. 2 is a section on line *2-2* on Fig. 1. Fig. 3 is a view through Fig. 1 on line *3-3*. Fig. 4 is a plan view of Fig. 3. Fig. 5 is a sectional view through line *5-5* on Fig. 1. Fig. 6 is a detailed view of the front end of the scale beam shown in Fig, 1. Fig. 7 is a perspective view of one of the scale beam weights while Fig. 8 is a longitudinal vertical section through a check valve.

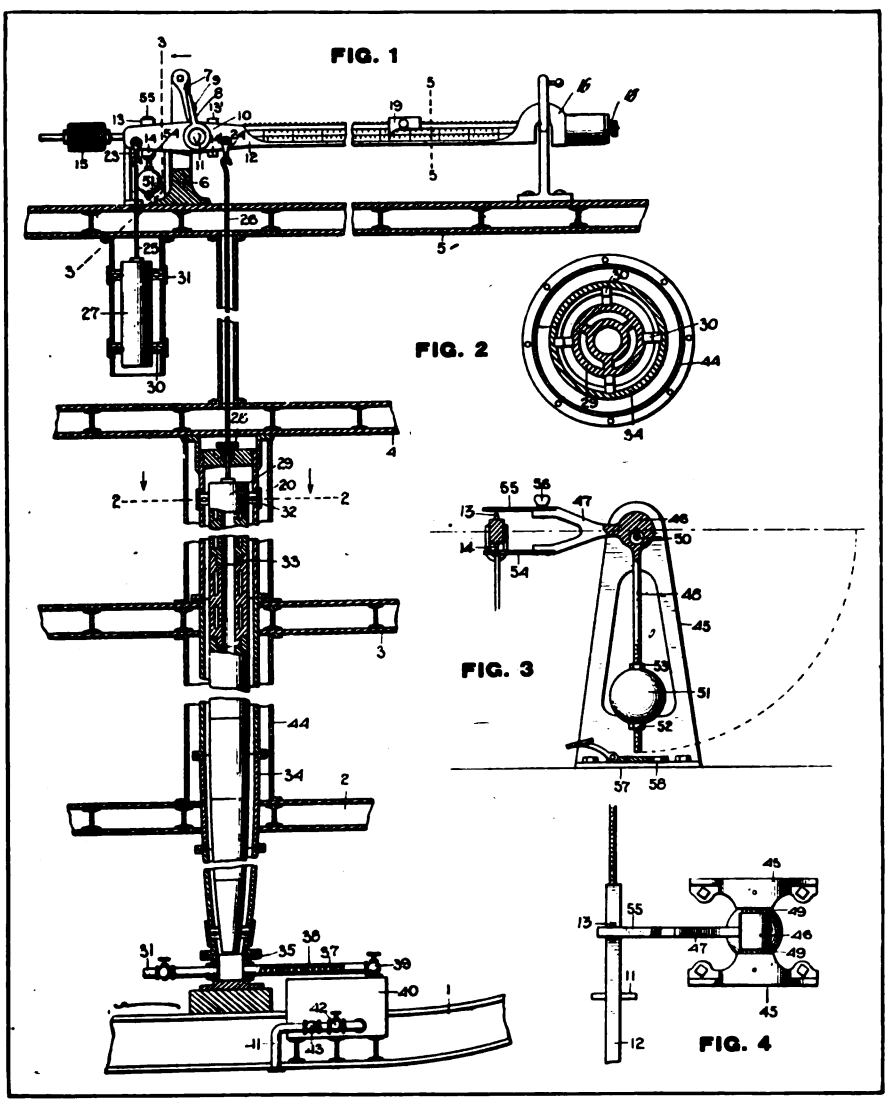


FIG. 1 IS A SECTION OF A SCALE FOR WEIGHING A SHIP AND ITS CARGO FIG. 2 IS A CROSS SECTION OF FIG. 1 WHILE FIGS. 3 AND 4 SHOW THE DEVICE FOR COMPENSATING FOR PITCHED POSITIONS OF THE SHIP

In the illustrations, *1* is the ship's bottom while *2*, *3*, *4* and *5* are decks. The standard that carries the scale is shown at *6*. This is provided with a bracket, *7*, to which the yoke, *8*, is fastened. This yoke carries the knife-edge pivots, *11*, which bear in the holes *10*. The knife bearings are securely fastened to the scale beam *12*. The beam is provided with a counterweight, *15*, and a hook, *16*. A retaining plate, *18*, is secured to the hook by means of the stud, *17*. This stud carries a number of weights, *20*, which slip one over the other. The scale beam is also provided with a movable weight, *19*.

How the Device Works

Each of the weights, *20*, is equal to the weight of *19* when it is at its outermost point on the scale beam. These weights are used as follows: After the weight *19* has been moved to its outermost position the first time, the pin, *17*, and the plate, *18*, are fitted in place and the weight, *19*, moved back to the starting point. Upon the second movement of the weight *19* to the outer end of the beam, a sleeve, *20*, is placed in position over the pin, *17*, and the weight, *19*, moved back to its starting point a second time. This procedure continues until the ship is fully loaded. To hold the sleeves in place, they are provided with a bayonet slot, *21*, and a pin, *22*, as shown in Fig. 7.

The scale beam is equipped with links, *23* and *24*, which carry the rods, *25* and *26*. Rod *26* is connected to a plunger, *29*, which fits a casing *34*. This casing is supplied with a protection jacket, *44*. It is guided by the bearing *28*. Rod *25* is connected to the weight *27*, which is guided by sockets, *31* and *32*. Both the plunger and the weight are suspended from frictionless knife-edge bearings, *30*. A slight pull on the weight by rods *25* and *26* causes actuation. The weight, *27*, is open to atmospheric pressure which causes it to respond to the attraction of gravitation while the plunger, *29*, is partly submerged in oil which causes it to exert a greater or

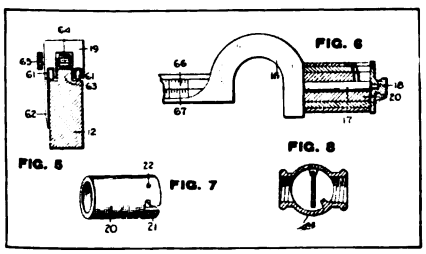
less pull on the scale beam *12* according to the degree of submergence of the weight.

The plunger *29* is composed of a number of sections joined together by threaded extensions, *33*. In design, the plunger is hollow and tapers from top to bottom. The bottom section of the casing, *35*, is equipped with an inlet pipe, *36*, which supplies oil to the casing. Several baffle plates, *38*, are arranged in the pipe *37*. These prevent rapid surging of the oil. The object of this is to prevent the wave motion outside the vessel from affecting the level of the oil in the casing.

Check Valve Controls Supply

A sufficient quantity of oil to fill the casing, *34*, is carried in the tank, *40*, which is connected to the pipe, *37*, by the unit *39*. Sea water is introduced into the tank by the pipe *41*. This water, of course, exerts a pressure on the oil and, due to the fact that oil and water will not mix, the oil remains free at the top of the tank but at the same time under pressure exerted from the outside through the medium of the pipe *41*. This pipe is equipped with a shut-off valve, *42*, and a check valve *43*. Normally, this check valve remains slightly open but a sudden tossing of the ship, while passing through a heavy sea for instance, causes the inrushing water to close the valve tightly.

In operation, when a predetermined load has been placed in the ship, water gradually flows into the tank, *40*, which forces the oil into the casing, *34*. This causes the plunger, *29*, to become more buoyant, consequently moving it upward. This permits the weight *27* to actuate the scale beam; moving its outer end upward. Then the shift weight *19* is moved until the beam balances, thus ascertaining the weight



FIGS. 5, 6 AND 7 SHOW DETAILS OF WEIGHING MECHANISM WHILE FIG. 8 IS A CHECK VALVE CONTROLLING THE WATER SUPPLY

of the load. As the load is increased, the water continues to exert additional pressure on the oil which increases the buoyancy of the plunger, *29*, when the beam can again be balanced.

To correct the reading of the scale beam when the vessel is not on an even keel, due to loading conditions, the compensating mechanism shown in Figs. 3 and 4 is used. In these illustrations, *45* are standards that carry a journal *46* which merges into the bifurcated construction shown at *47* and a depending bar, *48*. To reduce friction, antifriction bearings, *49*, are interposed between the unit, *46*, and the standards, *45*. The unit, *46*, is suspended on a knife-edge bearing, *50*, which permits the weight, *51*, to cause the bar, *48*, always to remain in a vertical position. The weight is held in place by nuts, *52* and *53*, which may be adjusted to increase or decrease the leverage.

A thumb nut, *56*, holds the spring bars, *54* and *55*, in place. When the compensating mechanism is not in use, the thumb screw is loosened and the spring bar, *55*, turned to a position at right angles to that shown in Fig. 3 after which the bar, *48*, is moved to one side and the lever, *57*, raised until the lower end of the bar, *48*, projects through the aperture, *58*. This causes the device to be held out of operation with the spring, *54*, held at a distance from the beam, *12*.

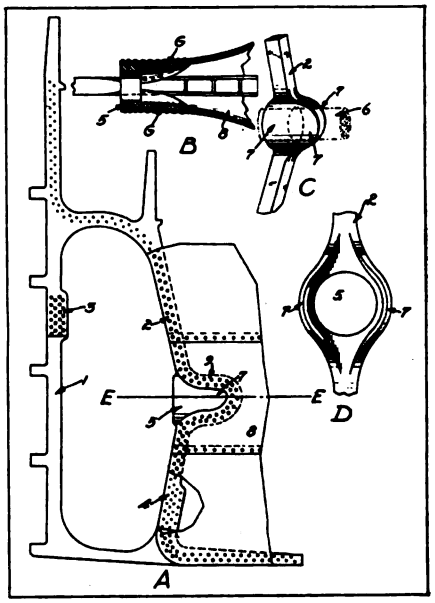
When it is necessary to use the compensating mechanism, it is arranged as illustrated in Figs. 1, 3 and 4, wherein the knife bars, *54* and *55*, engage, or nearly engage, the knife edges, *13* and *14*. If the forward section of the vessel is loaded first, naturally the vessel departs from an even keel which causes the weight and associated parts to swing toward the front and forces the spring, *55*, to press against the knife edge, *14*, thus assisting the weight *27* in proportion to the amount the vessel is pitched. If the stern of the vessel is loaded first, the device functions in the opposite manner.

Fig. 5 is a detailed view of the sliding weight, *19*. This is provided with traction wheels, *61*, and with a pointer, *62*. The beam *12* is equipped with a rack, *63*, which engages the pinion, *64*. A shaft and thumb nut, *65*, is provided for actuating the pinion. By this means the weight is readily moved along the beam. The beam is provided with a line of graduations, *66*, as shown in Fig. 6, which indicate pounds and tons while a second set of graduations, *67*, are provided for indicating feet. By this arrangement, it is pointed out, not only the weight of the load is ascertained but the draft of the vessel is also readily determined at any time.

Improved Sternpost

Fastening the shell plating of vessels to the sternpost is often a comparatively expensive operation due to the fact that special boss plates, faired in place, are necessary where the shell plating joins the shaft boss. To provide a ready means of fastening the shell plating at this juncture, a Portland, Oreg., inventor, Vincent Scarperi, recently developed the sternpost shown in the accompanying illustration. This device is patented.

In the illustration, *A* is a side elevation of the sternpost, *B* a plan section at the line *EE* on illustration *A*, *C* is a perspective view to illustrate the



STERNPOST PROVIDED WITH FLANGES FOR FASTENING SHELL PLATING IN PLACE OVER THE SHAFT BOSS

means provided for fastening the shell plating while *D* is an end view of the bossed portion of the sternpost looking toward the stern from the inside of the vessel.

Flanges Are Provided

The rudder post is shown at *1* while *2* is the propeller post. These two members are joined by scarfs *3* and *4*. The boss for the shaft is shown at *5* and through this the shaft extends as shown at *6* in illustration *C*. This portion of the propeller post is cast with flanges so proportioned and extended forward that a good bearing is formed for fastening the shell plating without the use of special boss plates. These flanges are shown at *7*. The inventor points out that the shell plating, shown at *8*, requires but little scarfing before it is riveted to the propeller post.

Portions of the shell plates are cut away, as shown at *9*, so that they may be attached to marginal portions of the flanges *7* which, it is pointed out, have substantially straight surfaces.

Pusey & Jones Co., Gloucester City, N. J., recently launched the ABRAHAM LINCOLN, a 12,500-ton cargo vessel. The LINCOLN is a sister ship to the INDIANAPOLIS, recently launched.

Activities in the Marine Field

Latest News from Ships and Shipyards

Boats Run Light as Cargoes Are Scarce

CARGOES for Great Lakes' vessels are scarce with the result that many boats are coming down the lakes light. Early grain shipments are about over and the number of bottoms in the market makes available more tonnage than is required for moving ore. Recently two large vessels were ordered down light and it is predicted that unless there is a change in the ore movement many ore carriers will have to dock until the situation improves. Orders for ore will have to be placed more freely to keep the big fleet busy and to permit it to transport sufficient ore before the heavy fall grain movement puts a severe tax on the capacity of the lake fleet. Coal is moving about as fast as it will at any period of the season.

* * *

The wooden barge BURMA, Montreal, which was in tow of the steam barge SIMLA of the Montreal Transportation Co., struck the west pier while entering Port Dalhousie harbor, recently, tearing a hole in her bow. After proceeding approximately 200 feet into the harbor, the BURMA sank. The concrete pier where the vessel struck was damaged considerably.

* * *

The steamer COMPTON has been floated by Captain Hickley, Oswego, N. Y., and has been taken to Ogdensburg, N. Y., for repairs. The COMPTON was running light when she grounded on a shoal near Butternut bay, seven miles west of Brockville, last fall. She was abandoned to the underwriters and later purchased by her original owners.

* * *

M. E. Farr, president of the American Shipbuilding Co., has returned from Europe where he opened an office in London.

* * *

The steamer AMERICA, of the Booth line, went ashore at Chicago bay recently in a fog but after lightering part of her cargo she released herself. It is reported that the vessel was not damaged to any extent as she was moving slowly when she struck.

* * *

The tug HUNKEY, one of 10 building for the Emergency Fleet corporation, at Superior, Wis., has made a successful trial trip and has left for tidewater.

* * *

The N. B. REAM made a recent loading record at Duluth when she docked and got away again in three hours and forty-five minutes. She took on 11,889 tons of ore. This is said to be the best loading time ever made at Duluth.

* * *

The steamer COPAL GROVE, built for the Emergency Fleet corporation, was given a trial trip at Duluth, recently, and after having her compasses adjusted she left for the coast.

* * *

There are 260 government ships to be commissioned this season on the Great Lakes and the shipping board recruiting service states that there is an acute shortage of seamen to man these craft. At the present time, government vessels are being put in commission on the lakes at the rate of approximately 10 a week.

* * *

Improvement of the Livingstone channel, which was delayed by the war, has been resumed by the government. At its narrowest point, the channel is now 300 feet wide but for a distance of about four miles, to make it conform to the rest of the channel, this will be increased to 450 feet. It is estimated by government experts that two years will be required to complete the job. So far, the government has appropriated $750,000 for the work but it is estimated that the complete undertaking will cost approximately $3,000,000.

* * *

The wreck of the steamer TEMPEST, at Erie, Pa., is being removed under the supervision of United States engineers and the wreck lights have been discontinued.

* * *

Cleveland inspectors Silas Hunter and D. A. Curran are at Montreal, and F. J. McCarty and C. A. Watson are at Sydney, N. S., inspecting steamers for the Emergency Fleet corporation.

* * *

The bow section of the steamer FRONTENAC was towed from Erie, Pa., to Quebec, Que., by the Great Lakes Towing Co.'s tugs GEORGIA and T. C. LUTZ. The stern section of the steamer, which was at Buffalo, has also been towed to Quebec. The steamer will be put together and taken to tidewater.

* * *

The American steamer LAKE PLACID, built in 1917 at Detroit, hit a submerged mine off the Island of Vinga near Gothenburg, Sweden, and sank in five minutes. All on board got away in safety. The LAKE PLACID registers 4200 tons and, while owned by the government, was under consignment to the Atlantic Transport Co. for operation. She left Baltimore with a cargo of coal consigned to Gothenburg.

* * *

The steamer J. G. WALLACE which collided with the J. S. MORROW off Eagle river, Lake Superior, was not damaged to any great extent. She will be repaired at Cleveland.

* * *

The steamer SONOMA which ran aground in the north entrance of Buffalo river, has had repairs completed at the Buffalo drydock. It was found necessary to replace 27 plates. She is now in commission.

* * *

The steamer ANDASTE while shifting to the Pittsburgh No. 7 coal dock at Duluth, for fuel, ran into the stern of the steamer COLONEL, damaging her steering gear and denting some plates.

* * *

The steamer B. R. BERRY, while shifting to the coal dock at Lorain, O., while partly loaded, hit the bank and damaged her rudder. She was docked for repairs.

* * *

The package freight lighter ADELE, which has been stationed at Duluth for the past 10 years, was towed to Buffalo by the steamer DELAWARE. She will be used to transfer light freight in Buffalo harbor. The ADELE is owned by the Great Lakes Transport Corp.

* * *

With the object of relieving masters, mates, engineers and pilots of steam vessels from the necessity of taking out licenses for each season, Congressman Louis C. Cramton, Republican, of Michigan, has introduced a bill providing that licenses be issued for life. It is provided, however, that licenses may be revoked or suspended on evidence of negligence, unskillfulness, inattention to duty, intemperance, or wilfull violation of the navigation regulations. The accused is to be allowed a hearing, to be represented by counsel and to testify in his own behalf. The bill further provides that no officer shall be subject to draft in time of war, except for the performance of duties named in his license.

* * *

The steamer CADILLAC of the Cleveland-Cliffs line recently picked up a power boat in Lake Huron about 25 miles off shore from Petosky, Mich. The power boat, which was 26 feet long, was without fuel. The three men aboard, Henry Barber, Alexander Gain and George Smith, all of Cheboygan, Mich., had tried to hail several passing vessels without success. Finally, however, the CADILLAC sighted them and ran alongside, picked them up and towed them to the entrance of the Soo river.

* * *

The steamer A. M. BYERS which was in collision with the JOHN B. COWLE in the St. Clair river, was docked at Ecorse, Mich., for repairs.

* * *

The following recommended drafts have been posted by the Lake Carriers' association: For Lake St. Clair, Vidal shoals, Fairport, Ashtabula and Conneaut, 20 feet; Buffalo, 20 feet to Lackawanna, Rogers-Brown, Pennsyl-

vania, B. R. & P., West Shore, Lehigh Valley and all docks below Ohio street bridge; for docks above the Ohio street bridge, 19 feet; the Donner Steel plant, 18 feet.

* * *

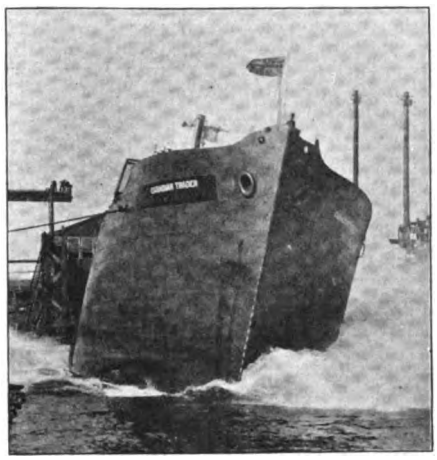
Dock property along Sandusky bay was severely damaged by a recent northeast gale. The stage of the water in Sandusky bay was reported the highest on record. For the first time since 1876 the floor of the Sandusky Yacht club's clubhouse was awash. The heavy seas broke over the old Cedar point dock at the foot of Columbus avenue. The storm was unusual as a northeaster generally lasts several days while this storm lasted but three hours.

* * *

The steamer CITY OF MEDFORD while docked at Collingwood, was recently destroyed by fire. She was owned by the Collingwood Transportation Co., partly insured, and valued at $12,000.

* * *

The Port Arthur Shipbuilding Co., Port Arthur, Ont., recently launched the CANADIAN TRADER, a full canal sized steel ocean freighter for the Canadian government's merchant fleet. This vessel is 260 feet long, 40 feet 6 inches beam with a molded depth of 23 feet. She is classed 100 A-1 by Lloyds and registers 3400 tons, deadweight. Her propelling machinery is placed amidships. Her engine is of the triple expansion upright inverted type with cylinders 20½ x 24 x 56 inches bore with 40-inch stroke and develops 1500 indicated horsepower. Steam is generated in two Scotch marine boilers 15 feet diameter x 11 feet long which are allowed a working pressure of 190 pounds to the square inch.



CANADIAN TRADER TAKING HER INITIAL PLUNGE AT PORT ARTHUR, ONT.

* * *

Search for the wreck of the steamer D. R. HANNA, which was sunk in a collision with the QUINCY A. SHAW off Thunder Bay island, Lake Huron, has been abandoned by the wrecking steamer FAVORITE. According to reports, the HANNA went down bow first with her after end sticking out of the water, but she disappeared entirely after a few hours.

* * *

The new wrecking steamer FAVORITE, which was described in detail in the May issue of THE MARINE REVIEW made good on her first job. She pulled the steamer ROYALITE off the head of Belle Isle, where she had been aground for three days, with but little trouble, notwithstanding the fact that the steamer IMPERIAL and the tugs HARDING and MICHIGAN pulled on the stranded boat but could not release her.

Late News From Atlantic Seaboard

THE New England Steamship association, recently organized, has petitioned Chairman Hurley of the shipping board to allocate to Boston larger ships of character suitable for foreign trade which the association feels may now be entered into with assurance of support by shippers. Although Boston has been allocated a number of ships, they are said to be suitable only for coastwise business and wholly inadequate for transatlantic voyages, being of relatively small tonnage and, in several cases, worn out in service. The association which comprises men identified with maritime interests, all of whom are widely known, desires to establish steamship connections with South American ports as well as with Europe. The president of the association is Capt. J. G. Crowley of the Coastwise Transportation Co., who, with Capt. E. E. O'Donnell and Charles Skentelberry, framed the petition to the authorities in Washington, the document being personally delivered by Senator D. I. Walsh.

* * *

The tug BALLCAMP, Captain Duncan, recently built at Elizabethport, N. J., has been turned over by the shipping board to the Boston Towboat Co. for operation.

* * *

The White Star line expects to place the CANOPIC on the route between Boston and the Mediterranean by midsummer. This ship is now employed by the British government in transporting troops from Italy to the Barbados.

* * *

During a fog the auxiliary schooner GERTRUDE MABEL, from Lockport, N. S., for Boston, struck on the breakwater at Rockport, Mass., and was a total loss. A cargo of live lobsters escaped from the vessel after she slid into deep water.

* * *

M. F. Donovan, president of the Boston Stevedoring Co., has opened an office in New York under the name of M. F. Donovan & Sons.

* * *

The Argentine sailing ship FORTUNA recently sailed from Boston for South Georgia island with supplies for the whaling station in that remote part of the world.

* * *

O. A. Gilbert, Boston, has sold for E. L. Haskell, Deer Isle, Me., the 3-mast schooner SUSAN N. PICKERING to New York interests. The vessel will load general cargo for Greece.

* * *

The Eastern Steamship Lines, Inc., has resumed service between Boston and Penobscot river ports, interrupted by the war, with the steamer CAMDEN which, for the present, will make three sailings weekly with Bangor as the terminus in Maine.

* * *

The 4-mast schooner BRADFORD E. JONES, built for Crowell & Thurlow, Boston, at Boothbay Harbor, Me., and recently placed in commission, has been chartered to carry lumber from Boston to Buenos Aires at $50 per 1000. The vessel is commanded by Capt. W. E. Reamie, Machias, Me., formerly of the schooner ESTELLE KREIGER.

* * *

With the sailing of the American steamship WEST CAPE for Antwerp, the Red Star line resumes service between Boston and Belgium interrupted by the war. The cargo included electric motors to be installed in lace factories.

* * *

An experiment that will be watched by shipping interests is the departure of the wooden steamship CUMBERLAND from Boston for Liverpool with a 3000-ton cargo. On the success of the venture may depend future sales of Ferris-type ships.

* * *

Each quarter, the Boston Marine society appropriates about $3500 for disbursement among its beneficiaries numbering in the vicinity of 90. The society recently held a ladies' night at Hotel Brunswick.

* * *

The Cape Cod Steamship Co. will resume service between Boston and Provincetown this season with the steamship DOROTHY BRADFORD which has been used two years by the sea training service of the shipping board. Captain Calhoun will be in command of the BRADFORD.

* * *

A report has it that Boston interests will contract with the Downey Shipbuilding Corp. for a 7800-ton steamship to be placed in the foreign trade.

* * *

The Providence Engineering Corp., Providence, R. I., recently launched the steel tug BRATTLEBORO at City Island, N. Y. This is one of the 10 similar vessels being built for the government. The hulls are constructed by Kyle & Purdy, City Island, N. Y.

* * *

The schooner JESSE HART 2, which has been in the coasting trade for 53 years, went ashore recently near Apple

river, N. S., and is a total loss. She was built in 1866 and registered 212 tons net.

* * *

The G. G. Deering yard, Bath, Me., recently launched the 5-mast schooner CARROLL A. DEERING. She is a 3-deck vessel registering 2114 tons. The vessel loaded coal at a Virginia port for Rio Janeiro at $19.50 a ton.

* * *

The steamer BELFAST which collided with the Sagamore highway bridge, Cape Cod canal, while on her first trip of the season from New York to Boston, was repaired at Bath, Me.

* * *

The Russian steamer NIJNI NOVGOROD recently arrived in Portland, Oreg., from New York on her way to Vladivostok by way of the Panama canal. She took a full cargo from New York and is scheduled to stop at Portland only long enough to be bunkered.

* * *

Several barges built for the government in Maine yards during the past year are offered for sale as the government has no use for them. It is said that the highest bid received was less than 50 per cent of the building cost.

* * *

The France-American Steamship Co., with A. Frankel as president, has been formed to operate vessels between New York, South Norwalk, Conn., and Boston. The company has rebuilt the propeller steamer MARION for use on this line and it is understood that other vessels will be added later.

* * *

The Louis B. Harrison Shipyards, Inc., Athens, N. Y., recently launched a 385-foot concrete railroad car float. This is the first craft of this type to be launched on the Hudson river. The craft took the water sidewise.

* * *

The steamer BERTHA was recently purchased by the Great Northern Refining Co. for use on the Kentucky river where she will transport oil from Beattyville to Carrollton. The company soon will have 10 more barges in this service.

Activities Along the Gulf Coast

THE Tampa Dock Co., Tampa, Fla., recently launched the HOOSAC, a 3500-ton Ferris type wooden cargo vessel for the shipping board. Other vessels previously built by the company are the NAMECKI, AGRIA and COULTER, which are sister ships of the HOOSAC. The company also recently completed and has in full operation a 2500-ton marine railway.

* * *

The OYAKA, a 3500-ton composite ship built by the Mobile Shipbuilding Co., Mobile, Ala., for the shipping board, successfully passed her trials and has been accepted by the government. Her keel was laid Jan. 8, 1918, and she was launched April 5, 1919. On her trial trip she logged an average of 11.11 knots, while her contract speed is 10 knots. She was brought from full speed ahead to sternway in 2 minutes 4¾ seconds.

* * *

The schooner N. E. TURNER, Mobile, Ala., owned by Robert L. Padgett & Co., was lost June 1 while on her way loaded with cotton from New Orleans to Bordeaux. She left the Louisiana port May 24.

* * *

The steamship NAIWA, allocated to Mobile, Ala., by the United States shipping board, will load cotton late in June for Liverpool. The cargo has been assembled since May 30.

* * *

The New Orleans association of commerce, San Francisco chamber of commerce and New York Merchants' association have issued a call for a national conference in favor of the Sanders free port zone bill, to be held in St. Louis late in June or early in July. Twenty-six Mississippi valley states, all in the Mississippi Valley association, have gone on record as favoring the immediate passage of the bill. The movement is being led by New York, San Francisco and New Orleans, because they are the ports which undoubtedly would be given the free zones immediately on passage of the bill. These free port zones are districts set apart on the waterfront of each port, to which raw products of foreign countries may be brought, duty-free, manufactured and the finished product shipped out, without the payment of import or export taxes of any kind.

* * *

First experiments in wireless telephony from a merchant ship on the Gulf of Mexico were successfully conducted by wireless operators on board the United Fruit Co.'s steamer PARISIMINA recently. The ship's officers spoke with Swan island, Colon and Panama, while in the middle of the Gulf.

* * *

The $15,000 lifesaving station with accommodations for 3000 persons in time of storm has been completed by the federal government at Grand isle, La., and has been accepted by the government. It is built of steel and concrete and will be placed in commission at once to be manned by a crew of 15 men. A wireless station is being built.

* * *

Survey of the new canal to Grand isle has been completed and the cost fixed at $10,000, which sum has been contributed by the police jury of Jerreson parish and residents of the island. The canal will enable boats to load without the aid of lighters or mule carts and will greatly facilitate commerce, which is entirely by boats, between Grand isle and New Orleans.

* * *

The Ley Shipbuilding Co., Mobile, Ala., launched its first concrete hull SELMA, early in June. The vessel is of 7500 tons and is a tanker for the Standard Oil Co.

* * *

The steamer ALTA, a composite ship, built by the Alabama Dry Dock & Shipbuilding Co., made her trial trip June 18.

* * *

The last obstacle in the completion of the Louisiana link of the intercoastal canal has been removed by the appropriation in the rivers and harbors bill of $100,000 for deepening and widening Bayou Black, between Houma and Morgan City. When this work is completed, which should be by the spring of 1920, it will be possible for large

Southern Shipyards are Busy

SIXTY-SIX cargo vessels, oil-tankers, coal barges and harbor tugs were under construction on June 1 in shipyards at New Orleans, Mobile, Ala., Pensacola, Fla., and other gulf ports, under the direction of the United States shipping board. The ships under construction follow:

Doullut & Williams Shipbuilding Co., New Orleans, eight 9600-ton deadweight steel cargo ships, 411 feet long, 55 feet beam.

Jahncke Shipbuilding Corp., Madisonville, La., two 3500-ton Ferris-type wooden ships.

Johnson Iron Works, New Orleans, six 100-ton harbor tugs.

National Shipbuilding Co., Violet, La., several seagoing steel oil barges.

Fred T. Ley Co., Mobile, Ala., three 7500-ton concrete and steel oil tankers, 420 feet long, 54 feet beam.

Mobile Shipbuilding Co., Mobile, Ala., twelve 5000-ton steel freighters, 335 feet long, 46 feet beam.

Pensacola Shipbuilding Co., Pensacola, Fla., ten 9000-ton steel cargo vessels, 417 feet long, 54 feet beam.

Alabama Dry Dock Co., Mobile, Ala., one 7500-ton coal barge for the Panama canal, 352 feet long, 52 feet beam.

Louisiana Shipbuilding Co., Slidell, La., ten 9600-ton steel hulls for the shipping board.

International Shipbuilding Co., Pascagoula, Miss., twelve 9600-ton steel hulls for the shipping board.

steamers and motor freighters to pass from New Orleans by inland waterways to the Sabine river, Texas, and thence, by the completion of the Point Isabel channel, to Brownsville, on the Rio Grande river.

* * *

The United Fruit Co. has purchased the land and will erect in February, 1920, a 10-story office building, at the corner of St. Charles and Union streets, New Orleans. The erection of the new building involves the destruction of the old Louisiana Lottery building, last relic of the days of the lottery in the United States.

* * *

Baton Rouge, La., 80 miles up the Mississippi river from New Orleans, is to be made the home port of a fleet of four vessels operated in the interests of the Aluminum Ore Co., East St. Louis, Ill., and the Aluminum Co. of America, Pittsburgh. The line will bring aluminum ores from the companies' mines in Colombia and Central America, and will carry return cargoes of general merchandise. At Baton Rouge the ore will be transshipped to barges and towed to the factories at East St. Louis. Seagoing steamers cannot proceed up the river to St. Louis, but there is deep water as far as Baton Rouge.

* * *

Beginning in November, 1919, Japanese steamers will run direct between Kobe and New Orleans, according to announcement by A. S. Sasabe, representative of the steam navigation department of Mitsui & Co. Mr. Sasabe was in New Orleans late in May, investigating harbor facilities and terminal machinery and the obtaining of wharf facilities for this line of steamers, whose principal cargo will be steel from the United States and Japanese goods this way. The company owns 80 large steamers, several of which are engaged in the rice trade with Cuba and Spain, 100,000 tons of Japanese rice being shipped by this firm to Cuba every year.

* * *

The Johnson Iron Works launched the DOGOLIA, first of six 100-ton steel steam tugs being built by the company, the smaller canals connecting New Or- April 29, into Bayou St. John, one of leans city with Lake Pontchartrain. Work on the DOGOLIA was started in October, 1918.

Up and Down the Pacific Coast

IN an effort to build up trade between north Pacific ports and the Orient, the United States shipping board has promised sufficient vessels to maintain a 28-day service from Puget sound and a sailing every six weeks from Portland, Oreg. This is particularly gratifying news for the Columbia river port as Portland has had no regular service to the Orient for several years. Puget sound has a half dozen direct, regular lines, but the government vessels are to be operated under the management of the Pacific Steamship Co., which has actively entered the oriental trade field. Seven shipping board vessels will be allocated to this oriental service, four to ply from Puget sound and three from the Columbia river. The WESTERN KNIGHT, WEST ISLETA and WEST HEMATITE have already been assigned to the Puget sound route and the WEST CELINA and WEST MUNHAM from Portland. These are new steel steamers, of 8800 deadweight tons each. In addition, the Pacific Steamship Co. has a number of chartered steamships operating to Japan, China and the Philippines.

* * *

In the near future, a great rate battle is to be waged before the interstate commerce commission, with Puget Sound and Portland, Oreg., as the contending forces. Portland has demanded a preferential rate on all commodities into that city and out. At the present time, and for several years past, these competing terminals have been on a rate parity and both have prospered. Portland now asks a differential in rates basing the claim on the assertion that its water level haul from the interior entitles it to lower freights. Astoria, Oreg., Portland's Columbia river rival, is prepared to join forces with Puget sound in combatting Portland's claims and this will probably prove to be one of the greatest rate battles in recent years.

* * *

Thousands of tons of flour are moving from Puget sound and Portland, Oreg., to Europe in new steel shipping board vessels. This cargo is being shipped under government direction and is intended to relieve the food situation in Europe. The demand in Europe has overshadowed the call for vessels in other trades so that new tonnage is being used to carry the immense quantities of flour recently purchased by the government.

* * *

H. C. Cantelow, assistant general manager of the Pacific Steamship Co., is in Washington in connection with matters affecting the future of the merchant marine. As one of the largest operators in Pacific waters, the Pacific Steamship Co. is vitally interested in the disposition of the new government fleet.

* * *

In an effort to eliminate the fish broker, the owners of 75 independent fishing vessels, with Seattle as the home port, have organized a marketing corporation through which it is hoped to dispose of their catches. Low prices paid for fish, entirely out of line with the high prices prevailing at the retail markets, have induced the operators to try this expedient in an effort to get better returns for their labor and investment. It is intended to use Seattle's cold storage facilities to keep fish when the market is too low to sell at a profit.

* * *

A cargo of railroad cars and other equipment was recently landed at Seward, Alaska, by the steamship ANYOX and barge BARODA, of the James Griffiths & Sons' fleet. The ANYOX and BARODA delivered a cargo of lumber from the Columbia river to a west coast port and came back with a return cargo of railroad material from the canal zone. The equipment is to be used by the government Alaska railroad.

* * *

The sailing schooner GUNN, built at the Cholberg yards, Victoria, B. C., was recently launched, this being the first of three vessels building at this plant for Capt. H. C. Hansen, Porsgrund Norway. The second schooner, the WASHINGTON, will take the water in June. The GUNN has been chartered to load lumber for the United Kingdom.

* * *

As rapidly as possible, wooden hulls as they are launched at Pacific northwest yards, are being towed to Lake Union, Seattle, where they are being moored in a fresh water basin, awaiting orders. There are now more than 20 hulls in this mooring and the picture is reminiscent of the "bridge of ships" calculated to defeat the Germans.

* * *

To organize the foreign trade bureau of the United States shipping board, a department just created, Harry Y. Saint, for two years secretary of the foreign trade bureau of the Seattle chamber of commerce, has been called to Washington. Mr. Saint has made a deep study of the possibilities of foreign trade and his appointment is taken to presage a wide and energetic campaign to foster business for the new American merchant marine.

Casco Goes North

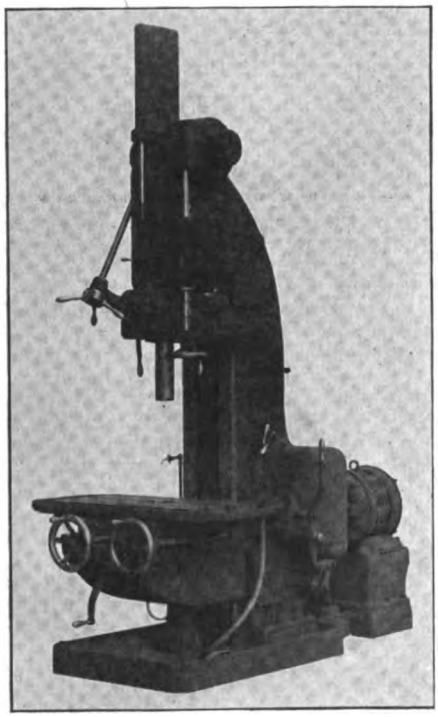
ONCE more the little schooner CASCO, *in which Robert Louis Stevenson cruised through the south seas, is to seek the paths of adventure. She recently left San Francisco, bound on a mysterious voyage to the Far North carrying 30 adventurous individuals who have formed the Northern Mining & Trading Co. with the intention of operating a placer mine "somewhere" beyond the Arctic circle. The* CASCO'S *first stopping point is Dutch harbor where she will lay up until the ice pack permits her to proceed.*

Equipment Used Afloat and Ashore

Drilling Machine—Magnetic Compass—Scarfing Machine—Ventilator Cowl—Countersinking Ship Plates—Sheet Metal Cutter

RAPID and accurate drilling operations on marine work require rigid machine tools that can be operated for long periods without interruptions for overhauling or repairs. For severe service, the machine shown in the accompanying illustration was recently developed by the Defiance Machine Co., Defiance, O.

The machine is a self-contained, electrically driven unit consisting of a column which carries the drill spindle, with its feeding mechanism, and a rigid knee which supports the platen. The column is bolted to a



HEAVY DUTY DRILLING MACHINE

base plate that also accommodates the motor bracket.

The spindle is 3½ inches in diameter, made from a high-carbon steel forging and is provided with ball thrust bearings to eliminate wear. It is driven through the medium of helical-cut gears which have two keys through the driving sleeve into the spindle, located near the nose. This feature, it is pointed out, eliminates torsion in the spindle. The thrust of the keys and helical gears is taken by a substantial thrust bearing.

The drive is a unit located in the back of the column. It consists of two cones of four gears each which run idle except when one set is meshed by a roll-in gear. The gear cones are driven by back gears operated by a friction clutch which is located on the drive shaft.

Four changes of feed are provided. These are operated by means of two cones of gears controlled by a lever within convenient reach of the operator when he is in a working position. The power feed stop is obtained by a lever connected to a clutch on the work shaft. It is operated by an adjustable stop rod connected to the top of the spindle. The feed is transmitted to the spindle by a worm gear. Rapid traverse of the spindle is obtained by means of a pilot handle.

The machine is entirely enclosed, permitting a gravity oiling system to be operated with a continuous flow of oil. The oil reservoir is in the bottom of the column. Oil is pumped to the top of the spindle and then flows to all bearings on the machine and back to the reservoir.

Provision is made for the liberal use of cutting compound. A tank, located in the column, is provided for this. The flow of lubricant is controlled by a pump equipped with a single valve near the outlet. The pump is also equipped with a relief valve.

The knee is of the box type, having large bearings gibbed to the column. It has a vertical adjustment of 15 inches through the medium of a telescopic screw operated by a crank handle at the front of the machine. This screw is offset to allow boring bars to pass through the platen without obstruction.

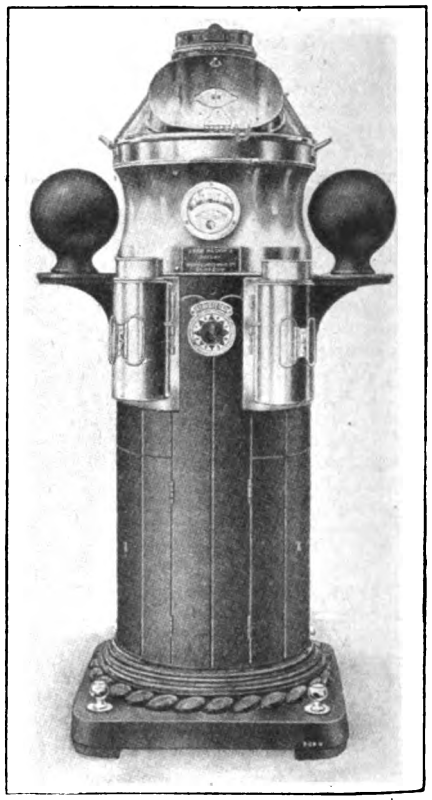
The platen has a working surface 17½ x 35 inches. It has a longitudinal adjustment of 18 inches with a 9-inch cross feed. It is located in a saddle which traverses over the knee. The platen is provided with three T-slots running lengthwise while the outer edge forms a dam for confining lubricant, which is carried away by means of flexible piping. These machines are also built with a plain platen which has up and down adjustment only.

The machine can be equipped with a tapping attachment which is an all-geared fixture located directly behind the main spindle drive gear. It is operated through the medium of a lever which is connected to a jaw clutch between the forward and reverse gear trains.

The machine has a capacity of 3-inch holes in steel, while the length of the power feed is 16 inches. The spindle is equipped with a No. 5 Morse taper. The distance from the center of the spindle to the column face is 12 inches while the maximum distance from the spindle nose to the platen is 32 inches.

Magnetic Compass

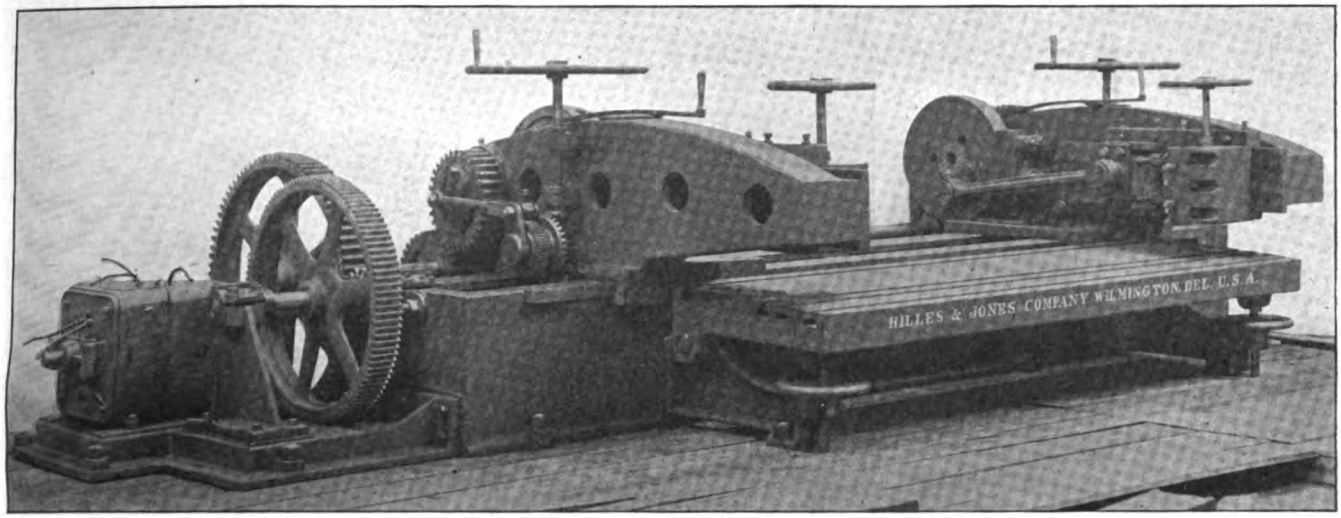
The compass shown in the accompanying illustration is a type designed for use on merchant vessels by Kelvin, Bottomley & Baird, Ltd., Glasgow, and supplied in this country by the Kelvin



MAGNETIC COMPASS FOR MERCHANT SERVICE

& Wilfrid O. White Co., Boston. This device is fitted with an azimuth mirror. The card is 10 inches in diameter and is designed on the Kelvin principle. It is said to be of light construction and is equipped with short needles of small magnetic movement which are suspended by silk threads from an aluminum ring.

The azimuth mirror is fastened to the outer bezel ring around which it turns freely. It is securely fastened to prevent it being dislodged by accident or by the pitching and rolling of the vessel in heavy weather. The under part of the bowl is made of heavy annealed



DOUBLE-HEAD SHIP PLATE SCARFING MACHINE WITH ADJUSTABLE TABLE AND ELECTRIC DRIVE—THE HEADS CARRYING THE CUTTING TOOLS AND DRIVING MECHANISM ARE ADJUSTABLE ALONG THE BED TO ACCOMODATE PLATES OF VARIOUS WIDTHS

glass. It is claimed that this member is as little liable to breakage as a metal bottom. The under part of the bowl contains oil which serves as a steadying medium when the ship is in motion. The bezel is conical shaped and is graduated in degrees on each side from 0 to 180. It is pointed out that this feature is useful for 4-point bearings.

The compass is illuminated from underneath. The electric lamp used for this purpose is placed at a sufficient distance under the bowl to prevent the possibility of compass errors due to close proximity of the lamp. Two oil lamps are also used to project the light upward to the compass. A mechanical light regulator is installed to permit the electric light being shaded. Among several well-known vessels equipped with this compass are the MAURETANIA, LUSITANIA, ADRIATIC, CELTIC, KENILWORTH CASTLE and the MARMORA.

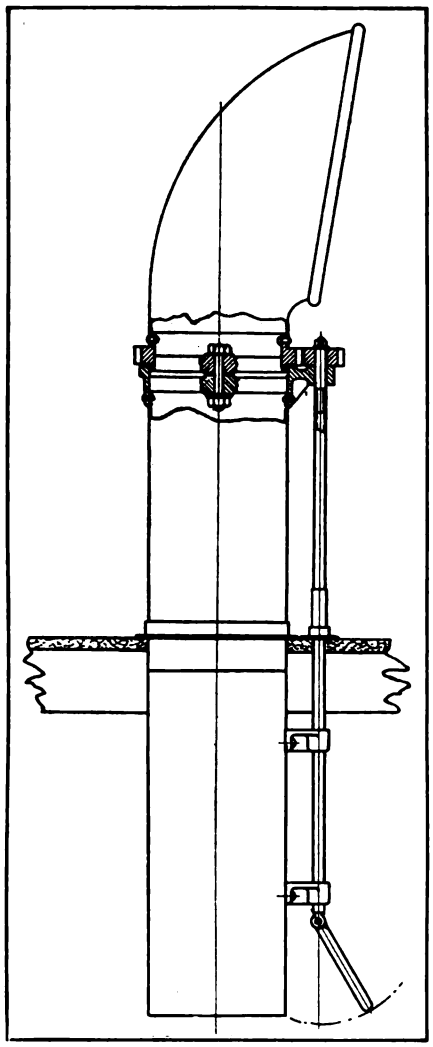
Ship Plate Scarfing Machine

Recent shipbuilding activities have resulted in the design of many special tools for shipyard work. Among these is the ship-plate scarfing machine shown in the accompanying illustration. This machine was developed by the Hilles & Jones Co., Wilmington, Del., and works on the draw-cut shaper principle and is designed to cut scarfs on both ends of a plate simultaneously. It is built in different lengths to provide for accommodating plates from 7 to 10 feet wide.

The work table is provided with four T-slots to facilitate bolting the work in place. This table is provided with an angular adjustment so that angles for scarfs of various lengths can readily be machined. The table is adjusted by two square-thread screws located at each front corner. The screws are rotated through the medium of hand wheels.

The two heads which carry the cutting mechanism are adjustable along the machine bed to accommodate plates of various widths. These heads are adjusted by means of hand wheels, while a power feed is provided for imparting an automatic feed for each tool when in operation. The heads carrying the cutting tools are actuated by means of a crank and pitman motion which is adjustable for different lengths. The cutting tools have a stroke varying from 6 to 19 inches and are provided with a quick return. This is accomplished through the medium of elliptical gearing. A lever is provided for throwing the cutting tools out of gear while the machine is running. Each elliptical gear is fitted with a clutch.

The machine is driven by a 15-horsepower motor of adjustable speed. The cutting speed is variable from 9 to 18 strokes per minute. The variation of speed is controlled by the speed of the motor. It is said that the draw-cut action, which starts the cut away from the edge of the plate drawing down to a feather edge if desired, operates without any tendency to buckle the plate. A number of these machines are in operation in various shipbuilding plants.



ELECTRICALLY WELDED VENTILATOR COWL

Ventilator Cowl

With the object of reducing skin friction as much as possible and of securing easy manipulation, the Ohio Blower Co., Cleveland, recently developed the installation shown in the accompanying illustration. The design of the cowl differs radically from time-honored practice due to the fact that this member is made of plates running vertically instead of radially. This feature, it is pointed out, reduces skin friction and eliminates any pockets where moisture might collect. The sections of the cowl are joined by electric welding.

The turning gear, which is operated from below deck according to approved practice, is placed comparatively high,

just below the cowl. This feature permits the cowl to be turned easily even in a high wind due to the fact that the leverage developed by a long pipe is absent. Thus the turning gear and pinion operate easily.

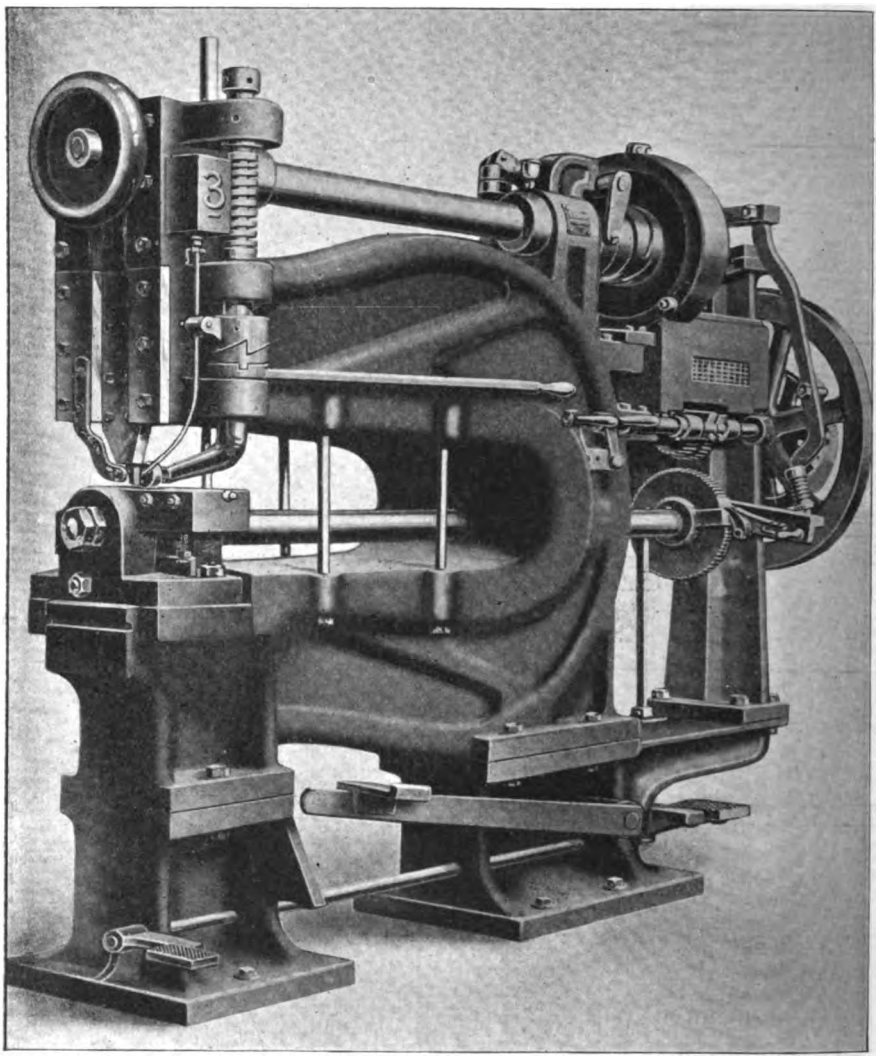
Instead of turning the sheet metal over a wire to form the mouth of the cowl, a heavy slotted pipe section is used. This feature is said to afford ample strength and permanency. The company has furnished a number of these cowls to the Emergency Fleet corporation and to shipbuilders building for private account.

Countersinking Ship Plates

For countersinking ship plates in fabricating shops and in shipyards, the portable, electric drill, mounted on a special buggy, shown in the accompanying illustration, is said to give good service. The electric drill utilized is a product of the Van Dorn Electric Tool Co., Cleveland, while the buggy was supplied by the Louis F. Shoemaker Co., Pottstown, Pa. The drill was designed especially for this purpose. It is 22 inches long, weighs 125 pounds and takes direct current at 230 volts. Its maximum speed is 425 revolutions a minute. It is equipped with a No. 4 morse taper socket and will countersink holes up to 1-inch diameter. It is claimed that a ⅞-inch hole can be countersunk in 7 seconds. With the object of reducing friction to a minimum, the drill is equipped with ball bearings.

The buggy consists of a frame supported on two wheels and is equipped with two handles by means of which the operator guides the device and feeds the countersink into the holes to be machined. The drill is fastened to the buggy by two studs which are screwed to trunnion bosses on the drill housing. One stud is passed through the frame of the buggy while the other engages a cross tie between the buggy handles. The buggy is equipped with a counterweight in front to insure ease of operation. In operation, the plates are laid out on the floor, in which position it is a simple matter to pass the buggy from one hole to another as the work progresses.

PORTABLE BUGGY EQUIPPED WITH AN ELECTRIC DRILL FOR COUNTERSINKING SHIP PLATES



TOOL FOR CUTTING IRREGULAR SHAPES FROM SHEET METAL WITHOUT DISTORTION

Sheet Metal Cutter

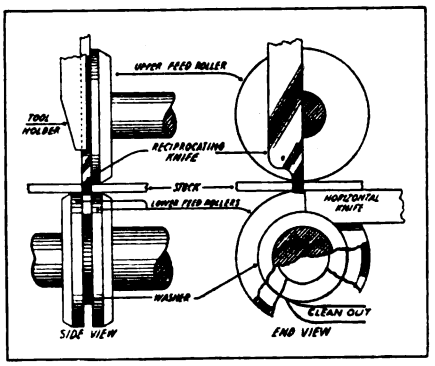
Cutting sheet metal into special shapes is usually a comparatively slow process as the work is done generally by hand with a hammer and cold chisel or by means of a cutting torch. The machine shown in the accompanying illustration, which is a product of the W. J. Savage Co., Inc., Knoxville, Tenn., was designed for cutting sheet metal into various shapes with the least possible delay. It is pointed out that the tool is not a rotary shear and that it does not distort the sheet or plate during the cutting operation.

In design, the tool resembles an ordinary punch press as far as its

general outline is concerned. The cutting is done by means of a reciprocating knife actuated by the upper shaft. This knife works against a lower stationary knife while the stock is fed by means of feed rollers, being guided by hand. The details of the cutting mechanism are graphically shown in the small illustration.

It is said that the tool can be successfully operated by a comparatively unskilled man and that it is well adapted for use in shipyards. Among the shipbuilding plants using this machine is the Philadelphia navy yard. The sheet or plate is automatically fed into the machine at a speed depending on the thickness of the metal to be cut. This ranges from 10 to 80 inches a minute. The feed and direction of the cut is said to be absolutely under the control of the operator and can be instantly stopped and started at any point.

The machine cuts both external and internal shapes. With stock 3/16-inch and thinner, the cut can be started directly on the machine.



DETAILS OF THE CUTTING MECHANISM

Business News for the Marine Trade

Offices and the storeroom of the Bruce Drydock Co., Pensacola, Fla., recently were damaged by fire.

A plant will be established by the St. Louis Boat & Engineering Co., St. Louis, for building barges, etc.

Fire recently damaged part of the plant of the Gray's Harbor Motor Ship Corp., Aberdeen, Wash.

The plant of the Dubuque Boat & Boiler Works, Dubuque, Iowa, recently was damaged by fire.

A recent increase in capital from $50,000 to $250,000 was made by the Pacat Steamship Corp., New York.

The Robbins Drydock Co., 29 Beard street, Brooklyn, N. Y., is reported planning to make improvements to its engine plant.

Capitalized at $20,000 the Union Tow Boat Co., New York, recently was incorporated by J. A. Storey, H. W. Bailey and D. Hunter.

Erection of a building will be undertaken shortly by the Astoria Marine Iron Works, Astoria, Oreg., on a 60-acre site which it recently purchased.

Contracts have been awarded by the commission of public docks, Portland, Oreg., for the construction of Pier No. 2, extension of Pier No. 1.

Work has started on the erection of two pontoons of an 18,000-ton drydock for the Ames Shipbuilding & Drydock Co., Seattle.

Erection of additions to its docks is reported being planned by the Perth Amboy Drydock Co., Perth Amboy, N. J.

Establishment of a shipbuilding plant at Chattanooga, Tenn., is reported under contemplation by the Tennessee River Navigation Co., Chattanooga, Tenn.

Articles of incorporation have been filed by the Badger Motor Boat Co., Racine, Wis., organized with $10,000 capital, by Martin and William Draeger and Clarence Bornofski.

The Anderson Shipbuilding Co., Kirkland, Wash., is reported considering converting its yard into a repair plant for steel and wooden vessels.

McArdle & Cooney, 8 East Lombard street, Baltimore, have arranged to erect a 1-story plant, 50 x 100 feet, for the manufacture of steam valves, etc.

Installation of machinery for the manufacture of anchors, winches and other marine equipment is contemplated by the Marine Equipment Co., Mobile, Ala.

The W. F. & R. Boat Builders, Inc., Kingston, N. Y., recently increased its capital from $10,000 to $60,000.

A branch office has been opened by the Triangle Steamship Co., Inc., 414 Whitehall street, New York, at 728 Lafayette building, Philadelphia.

The Universal Rotary Steam Engine Co., Seattle, recently was incorporated with $600,000 capital, by W. R. Searl, I. M. Searl and R. L. Walton.

Plans for the erection of a dock to include a small craft drydock of 200 tons capacity, are being drawn for the Lake Union Dock & Machine Works, Seattle.

The Federal Shipbuilding Co., Kearney, N. J., bought a number of drilling machines recently, and is reported contemplating the purchase of $125,000 worth of equipment for a drydock and ship repair plant.

It is reported extensive improvements will be made to the Grand Trunk harbor terminal docks at Portland, Me.

The Chicago Bridge & Iron Works, Throop street, Chicago, is reported planning to establish a steel barge plant on a 5-acre site on the Calumet river.

According to a report, the Hamme Marine Railway, Wilmington, N. C., which plans to construct steel and wooden vessels, will build a plant and install electrical machinery.

Additional machinery and equipment will be installed at the plant of the International Shipbuilding Co., Gulfport, Miss. The company has increased its capital from $200,000 to $1,000,000.

Modernization of its docks and coal handling plant is expected as the result of the recent increase in capital from $25,000 to $75,000 made by the Fellenz Coal & Dock Co., Milwaukee.

Conversion of its wooden shipbuilding plant into a yard for building steel vessels is reported under contemplation by the Patterson-MacDonald Shipbuilding Co., Seattle.

Capitalized at $300,000 the John Rourke & Sons, Savannah, Ga., recently was incorporated and plans are being made to increase the plant's marine repair facilities.

F. J. McDonald, Ardmore, Pa., was named as one of the incorporators of the Globe Ship Supply Co., Philadelphia, which was recently incorporated with $50,000 capital.

The Brewer Drydock Co., Mariners Harbor, N. Y., recently awarded a contract for the erection of a machine shop, one story, 51 x 80 feet, to be built at an estimated cost of $16,000.

George & Bliss, Lake street, Lake Placid, N. Y., have awarded a contract for erecting a power boat plant, 95 x 100 feet, to be built at an estimated cost of $25,000.

The property of the R. B. Phillips Co., Worcester, Mass., manufacturer of screw machine products, recently was purchased by the American Steam Gauge & Valve Co., Boston.

The International Valve & Piping Co., Pittsburgh, capitalized at $100,000, has been chartered by B. F. Harris, 6621 Wilkins avenue, H. D. Wilson, 1121 Howard road, and others.

The Warren Steam Pump Co., Warren, Mass., is reported planning to build a 1-story, 85 x 200-foot plant, a 1-story, 40 x 130-foot boiler house and a 1-story, 40 x 130-foot office building at an estimated cost of $75,000.

Among the recent incorporations is that of the Dickerson Engine Co., Salt Lake City, Utah. The company is capitalized at $1,000,000 and was incorporated by S. Spiro, Joseph Lippman, Harry Lee, Arthur Dickerson and N. M. Ambrose.

Articles of incorporation were filed at Camden, N. J., recently, by the Penn Shipyards Corp. The capital stock of the company was placed at $1,000,000. The incorporators include Samuel Edelman, David McKnight Jr. and Robert D. Hughes.

Among the recent incorporations is that of the Gidley Boat Co., Ltd., Toronto, Ont., which has been incorporated to build ships, etc., with $100,000 capital. The incorporators are John A. Kent, Maxwell Purvis and others.

Repairing of boats, machinery, etc., will be the business engaged in by the Dominion Towing & Wrecking Co., Ltd., Midland, Ont., which was recently incorporated with $250,000 capital. The incorporators are James Playfair, Douglas L. White, David S. Pratt and others.

Melvin G. Hunt, 28 Douglas drive, Charles H. McArthur, 12 Spading avenue, Toronto, Ont., and others, were named as the incorporators of the H. A. Wood Mfg. Co., Ltd., Toronto, Ont., which was incorporated with $1,000,000 capital to manufacture valves, machinery, etc.

Incorporated with a capital of $150,000, the Houghland Boat & Barge Line Co., Evansville, Ind., plans to engage in the building of river barges, etc. One of the company officers is Walter G. Houghland.

The Bethlehem Shipbuilding Corp., Bethlehem, Pa., will erect a large valve shop at Readington, Pa., according to authoritative advices. The plant will give employment to more than 1000 men.

The Marine Repair & Construction Co., Albina avenue, Portland, Oreg., has awarded a contract to the Portland Bridge & Building Co. for necessary pile driving to increase the capacity of its plant from one to six ways. The new ways will be capable of handling vessels 200 feet in length. New

New Offices

Kelvin, Bottomley & Baird, Ltd., Glasgow, and Wilfrid O. White, Boston, have combined interests for handling navigation instruments made by the Glasgow concern. The new company is known as the Kelvin & Wilfrid O. White Co., which is organized under Massachusetts laws. The company's offices are located at 112 State street, Boston. A factory has also been equipped at 90 Washington street, Boston.

Ray B. Whitman, a naval architect and formerly a patent engineer of Chicago, and employed during the war by the Emergency Fleet corporation at Cleveland, has recently opened an office at 505 Fifth avenue, New York, to practice as a patent attorney and engineer. Mr. Whitman will make a specialty of developing and patenting marine inventions, and advising on their sale or manufacture.

equipment will be needed. H. D. Sandstone is president.

The Moore Shipbuilding Co., Oakland, Cal., plans to erect a wooden floating drydock, consisting of five pontoons, each 90 x 125 feet, with a 20-foot overhang on each of the two end pontoons. The lifting capacity of the dock will be 20,000 tons and each pontoon will have its own pumping plant. The pontoons will be so connected with a locking device and will be so arranged that they can be submerged separately and one or more small boats docked simultaneously. The pumps will be electrically driven. Construction of the dock is expected to be completed in about six months.

New Trade Publications

WELDING.—A folder has just been issued by the Metal & Thermit Corp., New York, which describes the operations involved in making a weld on the 13½-ton broken upper jaw of an alligator shear used by Joseph Josephs & Bros., Modena, Pa. The break welded was 80 inches long and varied from 4½ to 25 inches in thickness.

KNOCK-DOWN BOATS.—A small illustrated booklet published by the Marine Iron Works, Chicago, is called "Steel Boats" and covers exclusively, boats which are built for shipment in knock-down shape. The feature of these boats is the labeling of all parts to correspond to the parts of a detailed erection drawing which is furnished with each shipment. These boats can be furnished up to 200 feet in length.

MAGNETIC COMPASS.—A pamphlet describing a magnetic compass designed for merchant-marine service has just been issued by the Kelvin & Wilfrid O. White Co., Boston. It is pointed out that this compass is fitted with an azimuth mirror and that the card is lighted from underneath. The under part of the bowl is made of heavy glass. The pamphlet contains several illustrations and describes the compass in detail.

SOOT CLEANERS.—The Vulcan Soot Cleaner Co., Du Bois, Pa., has issued a bulletin describing its front end and rear end types of soot cleaners. The company states that since 1906, approximately 2,000,000 horsepower of return-tubular and Scotch-type marine boilers have been equipped with its cleaners. The bulletin shows how the cleaners are installed in settings of typical construction. The bulletin will prove of interest to engineers and others who are interested in soot problems.

CRANES.—A 50-page illustrated bulletin has been issued by the McMyler Interstate Co., Cleveland, in which cranes, especially those for use in the shipbuilding industry, are described and illustrated. The data given are representative of present day practice. The types of cranes described and illustrated in the booklet are: Horizontal cantilever revolving cranes, which include hammerhead, pintle and turntable designs; boom jib cranes, of the pintle and turntable designs; standard locomotive cranes and overhead traveling cranes.

MARINE ENGINES.—A bulletin describing marine engines for small craft has been issued by the Hall-Scott Motor Car Co., San Francisco. The engines described are a 6-cylinder unit developing 200 horsepower and a 4-cylinder unit developing 130 horsepower. It is pointed out that these engines are modeled after the company's airplane engines which gave extensive service in France during the war. Several interesting facts pertaining to the development of the company's aircraft engines are included.

LIFE SAVING EQUIPMENT.—Alfred Varley Sims, New York, has issued a pamphlet describing his safety suits for use aboard ship. It is pointed out that the device is practicable and easily put on over the wearer's ordinary clothing. It is said that it will keep a person afloat in comparative comfort and that it permits the wearer to float upright in the water without the use of foot weights. The pamphlet describes the suit fully and points out that it can be worn without inconvenience and that it permits the wearer to swim with freedom.

CUTTING AND WELDING EQUIPMENT. — Nine bulletins enclosed in a loose-leaf cover, in which carbo-hydrogen cutting and welding equipment is described and illustrated, are being circulated by the Carbo-Hydrogen Co. of America, Pittsburgh. Each bulletin is devoted to its own particular subject. They are: Service; cutting torches and tips; welding torches and tips; regulators; regulators and small gages; lead-burning outfits; portable cutting outfits; safety first bulletin, and a bulletin which contains illustrations and descriptions of the various accessories.

TEMPERATURE CONTROLLING EQUIPMENT.—The Taylor Instrument Cos., Rochester, N. Y., has issued a 422-page catalog describing its instruments for the indicating, recording and control of temperature. Many special applications are illustrated, showing the manner in which the instruments can be adapted to various temperature needs. Much explanatory matter descriptive of construction and principles of operation is given. The list includes thermometers of every description, index and recording thermometers, hydrometers, pyrometers, temperature and pressure regulators, barometers, absolute pressure and draft gages.

CONTRACTORS' AND STEAMBOAT SUPPLIES.—R. Gracey & Sons Co., Pittsburgh, has just issued a catalog devoted to iron and steel supplies used by contractors and aboard steamboats. The catalog is well illustrated and gives complete descriptions of various tools and appliances which include ratchet pulling and pushing jacks, steamboat ratchet towing jacks, tow chains, wheel stirrups, flange bolts, circle bolts, firing tools, blower tubes, hoisting chains, general purpose hooks, pile caps, pile points, pipe clamps, dolly bars, rivet busters, water-cooled tuyeres for forges, hand-forged lathe tools, and a variety of other tools.

PLATE PUNCHES.—An illustrated, 22-page catalog has been published by the Norbom Engineering Co., Darby, Pa., describing punches, punch tables and reamers. One of the punches operates at 45 strokes per minute and has a built up steel frame construction which differs considerably from the standard C-frame type. The operating gears are direct-connected to a motor mounted on the punch. The head is of the floating type, riding on the plate except during the acthal punching. The plate punch tables described are designed to punch up to 6700 holes in 9 hours, and range in size from 20 to 40 feet. The reamers illustrated are from $\frac{9}{16}$ to $1\frac{9}{16}$ inches in diameter.

BUSINESS AND FACTORY SUPPLIES.—L. F. Grammes & Sons, Allentown, Pa., are issuing an illustrated catalog devoted to their office and factory supplies. Numerous illustrations are included and the articles listed are fully described. These include paper fastening machines, advertising novelties, loose-leaf binders, marking stencils, card and ticket holders, fastening clips, stencil dies, envelope openers, hinges, trucks, platform scale, metal seal presses, pen and pencil clips, badges of various types, time checks, etc. One of the interesting articles described is a metal paper bailing machine. It is pointed out that this device is fireproof and easily operated.

OIL ENGINES.—Heavy-duty oil engines are described in an attractive catalog recently issued by the Gulowsen Grei Engine Co., Seattle. The catalog is well illustrated and describes the company's engines fully. It is pointed out that these engines operate on crude or fuel oils of asphalt or paraffine base containing 1800 B.t.u. or more per pound and having a gravity of not less than 24 degrees, Be. Attention is drawn to the fact that these engines run satisfactorily without water injection which is used in European practice. Data are included which show comparisons between operating vessels with coal and oil. It is also pointed out that no standby expense is involved while in port.

ANSALDO WORKS.—An interesting booklet has just been issued which graphically describes the famous Ansaldo Works of Italy. This firm manufactures among other things, ships, airplanes, locomotives, projectiles, guns, engines and tools. It is pointed out that the conception of the works is due to Count Camillo Di Cavour when he was prime minister of Piedmont. They were started in 1846 in Sampierdarena under the directorship of Giovanni Ansaldo who gave his name to the works. The company also operates its own foundries and steel works. The booklet is profusely illustrated with views showing different departments of the works as well as some of the finished products. The scope of the company's manufacturing activities is remarkable.

LIGHTING APPARATUS.—The Benjamin Electric Mfg. Co., New York, has issued an illustrated, loose-leaf catalog describing its marine lighting and signalling apparatus. Among the devices described are watertight deck and ceiling fixtures, angle bulkhead fixtures, drop fixtures, hand portable lighting fixtures, nonwatertight shade holders, watertight junction boxes, connecting blocks, receptacles, switches, attaching plugs, covers, gaskets, glass globes, protecting guards, buzzers, bells, gongs, horns, push buttons, panel boards, gas and vapor proof fixtures, etc. The catalog is complete in every respect. Two types of illustrations are used, halftones made from photographs and reproductions of line drawings to show details. Many of the latter are dimensioned. The descriptions of the various articles are well written and concise.

GENERATING SETS.—Engberg's Electric & Mechanical Works, St. Joseph, Mich., has issued an attractive illustrated catalog describing its direct-current steam-driven generating sets of from 1 to 50-kilowatt capacity. These are self-contained units and are designed for use on board ship and ashore. Various component parts of the units are illustrated and described. Many reproductions from line drawings are included which show sectional views. It is pointed out that every machine is given a severe practical test under actual operating conditions before shipping to make sure that it will function properly when installed. Special features of the engine are a one-piece crankshaft, machined from forged steel; outside admission piston valve; a self-aligning outboard bearing for the shaft, and a one-piece bed plate.

STEAM MOTORS.—The Steam Motors Co., Springfield, Mass., is issuing an attractive illustrated catalog describing its appliance for generating power. The device described is a direct-connected turbine engine. It is pointed out that the salient feature of the device is that it is not a complete turbine in itself but when it is connected with its driven member it becomes an integral part of a complete unit. This feature, it is pointed out, makes the device a compact 2-bearing unit with any standard design of driven apparatus. Many of the illustrations shown are made from line drawings which show the working mechanism. Of especial interest to naval architects and marine engineers is the blower set, designed for inducing forced draft aboard ship. Attention is drawn to the fact that 166 vessels recently built by the American Shipbuilding Co., Cleveland, and the Manitowoc Shipbuilding Co., Manitowoc, Wis., are equipped with this device.

FRICTION CLUTCHES.—The Williams Foundry & Machine Co., Akron, O., is issuing a catalog describing its friction clutches. These appliances are said to be particularly adaptable to dividing line shafting into units and for handling the power control of heavy machinery. As a factor of safety, it is pointed out, these clutches are of advantage, due to the fact that in case of accident involving one machine, or a group of machines, power can instantly be thrown off. The catalog is of especial interest to plant maintenance engineers as the device is described fully. It is featured by a roll-type toggle joint which permits easy actuation of the parts in engaging and disengaging. The catalog includes also some valuable belting data and tables giving the horsepower of pulleys and belts, horsepower transmitted by steel shafting, sizes and weights per foot of cold rolled steel shafting, circumferences and areas of circles, weights and measures used in the United States and general mathematical rules.